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Key (2012)

Period _____

Spring Semester Multiple Choice Final Exam Review - Honors Algebra 3-41 a. Convert to degrees: $\theta = \frac{11\pi}{8}$ radians.A 135° B 67.5° C 123.75° D 247.5°

$$\frac{11\pi}{8} \cdot \frac{180}{\pi}$$

b. Convert to radians: $\theta = 245^\circ$, leave answer in terms of π .A $\frac{13\pi}{36}$ B $\frac{49\pi}{72}$ C $\frac{49\pi}{36}$ D $\frac{49\pi}{18}$

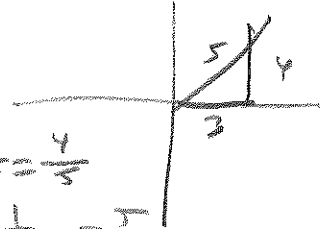
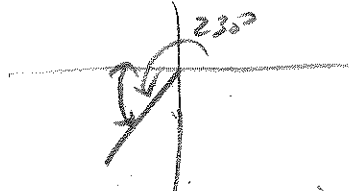
$$245 \cdot \frac{\pi}{180}$$

2. If the cotangent of an acute angle is $\frac{3}{4}$, find the value of the cosecant.A $\frac{3}{5}$ B $\frac{4}{5}$ C $\frac{5}{4}$ D $\frac{5}{3}$

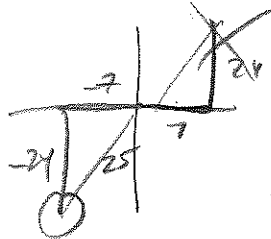
$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{3}{4} \cdot \frac{(x)}{(y)}$$

$$\sin \theta = \frac{y}{r} = \frac{4}{5}$$

$$\csc \theta = \frac{1}{\sin \theta} = \frac{5}{4}$$

3. Find the reference angle for $\theta = 230^\circ$.A 50° B 40° C 30° D 130° 4. Given the $\tan \theta = 2.5849$, find θ .A $.0451^\circ$ B 1.2017° C 21.1496° D 68.8504°

$$\theta = \tan^{-1}(2.5849)$$

5. Given $\tan \theta = \frac{24}{7}$ and $\sec \theta < 0$, find $\sin \theta$.A $\frac{24}{25}$ B $\frac{-7}{25}$ C $\frac{7}{25}$ D $\frac{24}{25}$ So $\cos \theta < 0$ 

$$\tan \theta = \frac{24}{7} \cdot \frac{(y)}{(x)}$$

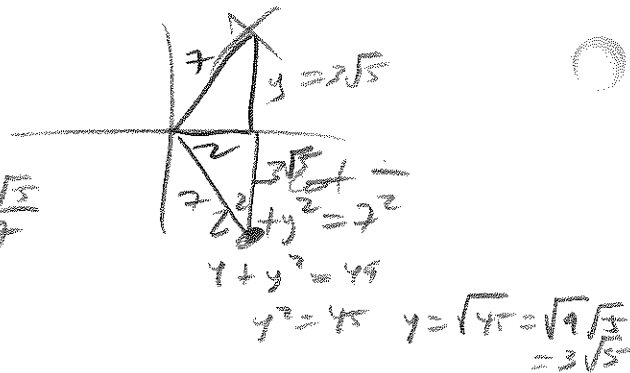
$$\sin \theta = \frac{y}{r} = \frac{-24}{25}$$

6. Given $\cos\theta = \frac{2}{7}$ and $\cot\theta < 0$, find $\sin\theta$.

- A $\frac{-\sqrt{53}}{7}$
- B $\frac{3\sqrt{5}}{7}$**
- C $\frac{3\sqrt{5}}{7}$
- D $\frac{\sqrt{53}}{7}$

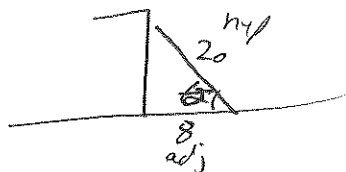
$$\cos\theta = \frac{2}{7} \frac{(x)}{(r)}$$

$$\sin\theta = \frac{(y)}{(r)} = \frac{-3\sqrt{5}}{7}$$



7. A 20 foot ladder rests on the side of a building. If the ladder is 8 feet from the base of the building, find the angle of elevation that the ladder makes with the ground to the nearest degree.

- A 22°
- B 24°
- C 66°**
- D 68°



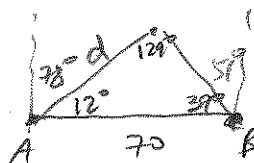
$$\cos\theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos\theta = \frac{8}{20}$$

$$\theta = \arccos\left(\frac{8}{20}\right) = 66.4^\circ$$

8. From fire tower A, a fire with bearing $N78^\circ E$ is sighted. The same fire is sighted from tower B with bearing $N51^\circ W$. Tower B is 70 miles directly east of tower A. How far, to the nearest mile, is it from tower A to the fire?

- A 19 miles
- B 57 miles**
- C 70 miles
- D 88 miles



law of sines:

$$\frac{70}{\sin 129^\circ} = \frac{d}{\sin 39^\circ}$$

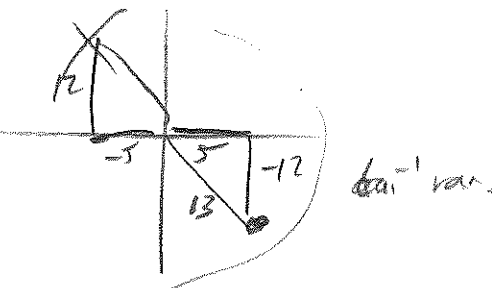
$$d = 70 \frac{\sin 39^\circ}{\sin 129^\circ} = 56.7$$

9. Find the exact value of the expression: $\sin\left[\tan^{-1}\left(\frac{-12}{5}\right)\right]$

- A $-\frac{12}{13}$**
- B $-\frac{5}{13}$
- C $\frac{5}{13}$
- D $\frac{12}{13}$

$$\tan\theta = \frac{-12}{5} \frac{(y)}{(x)}$$

$$\sin\theta = \frac{(y)}{(r)} = \frac{-12}{13}$$



10. Find the exact value of the expression: $\csc\left[\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)\right]$

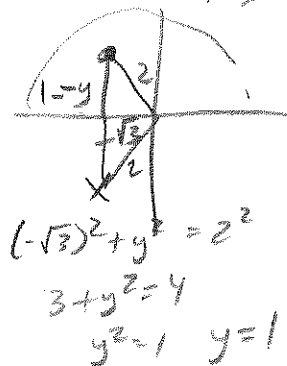
- A -2
- B $-\frac{\sqrt{21}}{7}$
- C $\frac{\sqrt{21}}{7}$
- D 2**

$$\cos\theta = \frac{-\sqrt{3}}{2} \frac{(x)}{(r)}$$

$$\sin\theta = \frac{y}{r} = \frac{1}{2}$$

$$\csc\theta = \frac{1}{\sin\theta} = 2$$

range of \cos^{-1}



11. Find the period in degrees: $f(x) = \sin\left(\frac{1}{3}x\right)$

- A 60°
- B 120°
- C 540°
- D 1080°**

$$0 < \frac{1}{3}x < 2\pi$$

$$0 < x < 6\pi$$

$$0 < \frac{1}{3}x < 360$$

$$0 < x < 1080$$

12. Find the period in degrees: $f(x) = \cos(4x)$

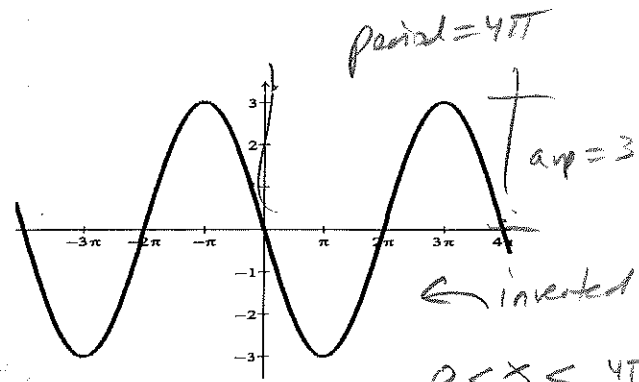
- A 45°
- B 90°**
- C 720°
- D 1440°

$0 < 4x < 360$
 $0 < x < 90$

13. Write the sine equation for the following:

- A $y = -3 \sin\left(\frac{\theta}{2}\right)$**
- B $y = -3 \sin(2\theta)$
- C $y = 3 \sin\left(\frac{\theta}{2}\right)$
- D $y = 3 \sin(2\theta)$

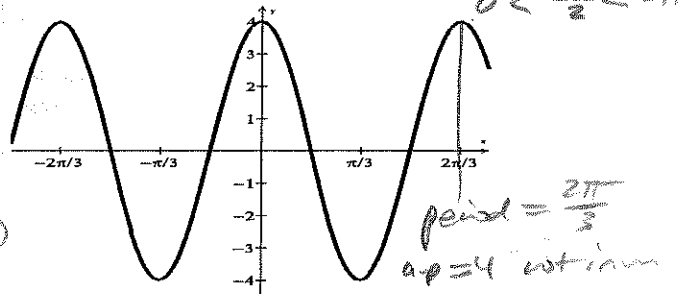
$y = -3 \sin\left(\frac{x}{2}\right)$



14. Write the cosine equation for the following:

- A $y = -4 \cos\left(\frac{\theta}{3}\right)$
- B $y = -4 \cos(3\theta)$
- C $y = 4 \cos\left(\frac{\theta}{3}\right)$
- D $y = 4 \cos(3\theta)$**

$y = 4 \cos(3x)$



15. Simplify: $\csc^2 x - \cot^2 x = \frac{a^2 - b^2}{(csc^2 x + cot^2 x)(csc^2 x - cot^2 x)}$ $0 < x < \frac{2\pi}{3}$
 $(csc^2 x + cot^2 x)(1)$ $0 < 3x < 2\pi$

- A $\csc^2 x - \cot^2 x$
- B $\csc^2 x + \cot^2 x$**
- C $2 \cot^2 x - 1$
- D $2 \csc^2 x + 1$

$\frac{\sin^2 x + \cos^2 x}{\sin^2} = \frac{1}{\sin^2}$
 $1 + \cot^2 x = \csc^2 x$
 $1 = \csc^2 x - \cot^2 x$

16. Simplify: $\frac{\sec x - \cos x}{\tan^2 x}$

- A -1
- B 1
- C $\sin x$
- D $\cos x$**

$\frac{\sec x}{\tan^2 x} - \frac{\cos x}{\tan^2 x}$

$\frac{\sec x}{1} \cdot \frac{1}{\tan^2 x} - \frac{\cos x}{1} \cdot \frac{1}{\tan^2 x}$
 $\frac{1}{\cos x} \cdot \frac{\cos^2 x}{\sin^2 x} - \frac{\cos x}{1} \cdot \frac{\cos^2 x}{\sin^2 x}$

$\frac{\cos x}{\sin^2 x} = \frac{\cos^3 x}{\sin^2 x} = \cos x \frac{(1 - \cos^2 x)}{\sin^2 x}$

17. Perform the addition and simplify: $\frac{\csc x}{\sin x} - \frac{\cot x}{\tan x}$

- A -1
- B 0
- C 1**
- D $\sin^2 x - \tan^2 x$

$\frac{\tan x \csc x - \cot x \sin x}{\sin x \tan x}$

$\frac{\frac{\sin x}{\cos x} \cdot \frac{1}{\sin x} - \frac{\cos x}{\sin x} \cdot \frac{\sin x}{1}}{\sin x \tan x} = \frac{1}{\cos x} - \frac{\cos^2 x}{\sin^2 x}$

18. Perform the subtraction and simplify: $\frac{\tan x}{1} - \frac{\sec^2 x}{\tan x}$

- A $-\cot x$**
- B $-\tan x$
- C $\cot x$
- D $\tan x$

$\frac{\tan^2 x - \sec^2 x}{\tan x} = \frac{-1}{\tan x} = -\cot x$

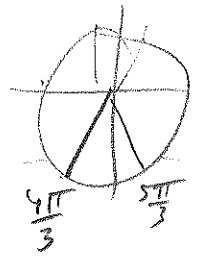
$\frac{1 - \cos^2 x}{\sin^2 x} = \frac{\sin^2 x}{\sin^2 x} = 1$
 $\frac{\sin^2 + \cos^2}{\cos^2} = \frac{1}{\cos^2}$
 $\tan^2 + 1 = \sec^2$
 $\tan^2 - \sec^2 = -1$

19. Find all solutions in the interval $[0, 2\pi)$: $2\sin x + \sqrt{3} = 0$

- A $\frac{\pi}{6}, \frac{5\pi}{6}$
- B $\frac{\pi}{3}, \frac{2\pi}{3}$
- C $\frac{7\pi}{6}, \frac{11\pi}{6}$
- D $\frac{4\pi}{3}, \frac{5\pi}{3}$**

$$2\sin x = -\sqrt{3}$$

$$\sin x = -\frac{\sqrt{3}}{2} \Rightarrow$$

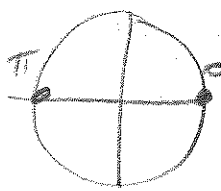


20. Find all solutions in the interval $[0, 2\pi)$: $\tan x \sec x = \tan x$

- A 0
- B $0, \pi$
- C $0, \pi$**
- D $0, \frac{\pi}{2}, \pi$

$$\tan x \sec x - \tan x = 0$$

$$\tan x (\sec x - 1) = 0$$



$$\tan x = 0$$

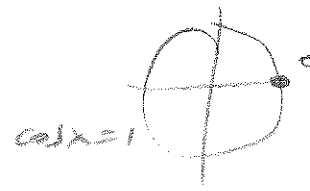
$$\frac{\sin x}{\cos x} = 0$$

$$\sin x = 0$$

$$\sec x - 1 = 0$$

$$\sec x = 1$$

$$\frac{1}{\cos x} = 1$$



21. Find all solutions in the interval $[0, 2\pi)$: $\csc^2 x - \csc x = 2$

- A $\frac{\pi}{6}, \frac{3\pi}{2}$
- B $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$**
- C $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$
- D 2, -1

$$\csc^2 x - \csc x - 2 = 0$$

$$u^2 - u - 2 = 0$$

$$(u-2)(u+1) = 0$$

$$(\csc x - 2)(\csc x + 1) = 0$$



$$\frac{1}{\csc x} - 2 = 0$$

$$\csc x = 2$$

$$\sin x = \frac{1}{2}$$

$$\csc x + 1 = 0$$

$$\csc x = -1$$

$$\sin x = -1$$



22. Find all solutions in the interval $[0, 2\pi)$: $2\cos^2 x + 3\cos x + 1 = 0$

- A $\frac{\pi}{6}, \frac{11\pi}{6}, 0$
- B $\frac{\pi}{3}, \frac{5\pi}{3}, 0$
- C $\frac{5\pi}{6}, \frac{7\pi}{6}, \pi$
- D $\frac{2\pi}{3}, \frac{4\pi}{3}, \pi$**

$$2u^2 + 3u + 1 = 0$$

$$(2u+1)(u+1) = 0$$

$$(u+1)(2u+1) = 0$$

$$(\cos x + 1)(2\cos x + 1) = 0$$



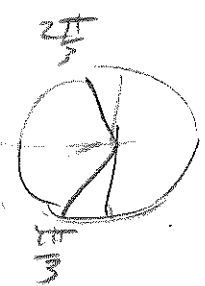
$$\cos x + 1 = 0$$

$$\cos x = -1$$

$$2\cos x + 1 = 0$$

$$2\cos x = -1$$

$$\cos x = -\frac{1}{2}$$



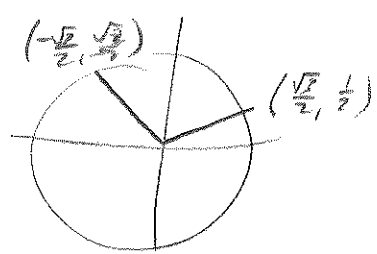
23. Evaluate: $\sin 165^\circ$ (Use the fact that $165^\circ = 135^\circ + 30^\circ$).

- A $\frac{\sqrt{2}-\sqrt{6}}{4}$
- B $\frac{\sqrt{6}-\sqrt{2}}{4}$**
- C $\frac{\sqrt{6}+\sqrt{2}}{4}$
- D $\frac{1+\sqrt{3}}{2}$

$$\sin(135+30) = \sin 135 \cos 30 + \cos 135 \sin 30$$

$$= \frac{\sqrt{2}}{2} \frac{\sqrt{3}}{2} + \frac{-\sqrt{2}}{2} \frac{1}{2}$$

$$= \frac{\sqrt{6}-\sqrt{2}}{4}$$



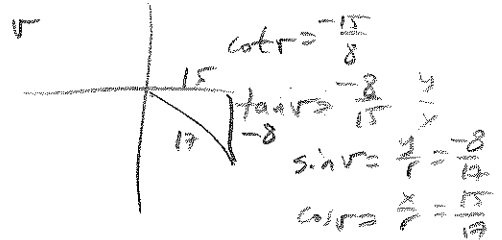
24. Write the expression as the sine, cosine, or tangent of an angle: $\cos 125^\circ \cos 40^\circ - \sin 125^\circ \sin 40^\circ$
- A $\cos 85^\circ$
 B $\sin 85^\circ$
 C $\cos 165^\circ$
 D $\sin 165^\circ$
- $\cos u \cos v - \sin u \sin v = \cos(u+v)$
 $= \cos(125+40)$
 $= \cos(165)$

25. Given $\sec u = \frac{-5}{4}, \frac{\pi}{2} < u < \pi$ and $\cot v = \frac{-15}{8}, \frac{3\pi}{2} < v < 2\pi$, find $\sin(u-v)$.

- A $\frac{-36}{85}$
 B $\frac{3}{85}$
 C $\frac{77}{85}$
 D $\frac{91}{85}$

$\sec u = \frac{-5}{4} \Rightarrow \cos u = \frac{-4}{5}$
 $\cot v = \frac{-15}{8} \Rightarrow \cos v = \frac{-15}{17}, \sin v = \frac{-8}{17}$

$\sin(u-v) = \sin u \cos v - \cos u \sin v$
 $= \frac{3}{5} \cdot \frac{-15}{17} - \left(\frac{-4}{5}\right) \cdot \left(\frac{-8}{17}\right)$
 $= \frac{-45 - 32}{85} = \frac{-77}{85}$

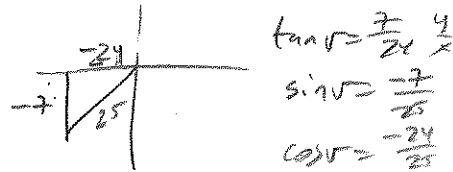


26. Given $\csc u = \frac{13}{12}, 0 < u < \frac{\pi}{2}$ and $\tan v = \frac{7}{24}, \pi < v < \frac{3\pi}{2}$, find $\cos(u-v)$.

- A $\frac{-204}{325}$
 B $\frac{-187}{325}$
 C $\frac{-36}{325}$
 D $\frac{437}{325}$

$\csc u = \frac{13}{12} \Rightarrow \sin u = \frac{12}{13}$
 $\tan v = \frac{7}{24} \Rightarrow \sin v = \frac{-7}{25}, \cos v = \frac{-24}{25}$

$\cos(u-v) = \cos u \cos v + \sin u \sin v$
 $= \frac{5}{13} \cdot \left(\frac{-24}{25}\right) + \left(\frac{12}{13}\right) \cdot \left(\frac{-7}{25}\right)$
 $= \frac{-120 - 84}{325} = \frac{-204}{325}$



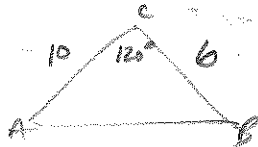
27. Find the area of the triangle to the nearest tenth, with sides of length, 43, 53, and 72.

- A 123.5
 B 1131.9
 C 3712.6
 D 15,099.6

Heron formula: $S = \frac{a+b+c}{2} = \frac{43+53+72}{2} = 84$
 $A = \sqrt{84(84-43)(84-53)(84-72)}$
 $= \sqrt{84(41)(31)(12)}$

28. In $\triangle ABC$, $BC = 6$, $AC = 10$ and $m\angle C = 120^\circ$. What is the area of $\triangle ABC$?

- A 15
 B $15\sqrt{3}$
 C 30
 D $30\sqrt{3}$

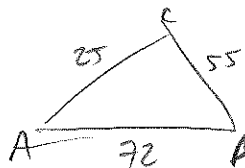


$A = \frac{1}{2}(6)(10)\sin 120^\circ$
 $= 30\left(\frac{\sqrt{3}}{2}\right) = 15\sqrt{3}$



29. Given a triangle with sides $a = 55$, $b = 25$, and $c = 72$, find $m\angle C$.

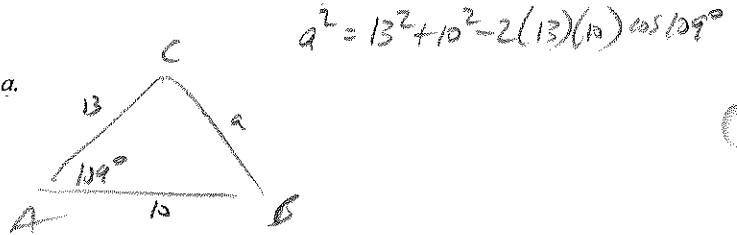
- A 17
 B 39
 C 56
 D 124



Law of Cosines
 $72^2 = 25^2 + 55^2 - 2(25)(55)\cos C$
 $5184 = 3650 - 2750\cos C$
 $1534 = -2750\cos C$
 $\cos C = \frac{-1534}{2750}$
 $C = \cos^{-1}\left(\frac{-1534}{2750}\right) \approx 123.9^\circ$

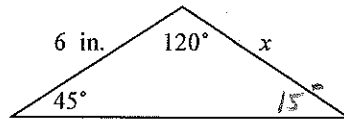
30. Given a triangle with $A=109^\circ$, $b=13$, and $c=10$, find a .

- A 18.81
 B 20.47
 C 23.16
 D 353.65



31. Solve for x in the given triangle.

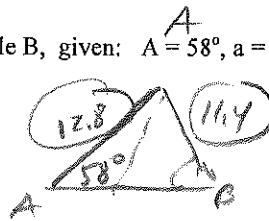
- A 2.20 in.
 B 4.39 in.
 C 7.85 in.
 D 16.39 in.



Law of Sines
 $\frac{x}{\sin 45^\circ} = \frac{6}{\sin 15^\circ}$

32. Find all possible measures for angle B, given: $A=58^\circ$, $a=11.4$, and $b=12.8$

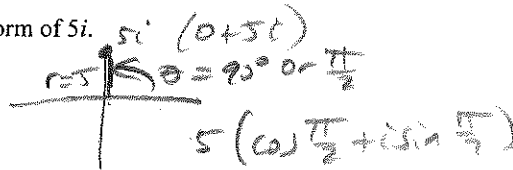
- A 72°
 B 108°
 C Both A and B
 D no triangle exists



possible 2 triangles
 $b > a$ so 2 triangles
 $\frac{12.8}{\sin B} = \frac{11.4}{\sin 58^\circ}$
 $\sin B = .95719$
 $B = 72^\circ$ or $180 - 72 = 108$

33. Rewrite the following in trigonometric form of $5i$.

- A $5(\cos 0 + i \sin 0)$
 B $5\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$
 C $5(\cos \pi + i \sin \pi)$
 D $5\left(\cos \frac{3\pi}{2} + i \sin \frac{3\pi}{2}\right)$



34. Use DeMoivre's theorem to evaluate: $[3(\cos 80^\circ + i \sin 80^\circ)]^4 = 3^4 (\cos(4 \cdot 80) + i \sin(4 \cdot 80))$

- A $3(\cos 320^\circ + i \sin 320^\circ)$
 B $12(\cos 320^\circ + i \sin 320^\circ)$
 C $81(\cos 80^\circ + i \sin 80^\circ)$
 D $81(\cos 320^\circ + i \sin 320^\circ)$

$81 (\cos(320) + i \sin(320))$

35. Determine which of the following is a cube root of -64 using DeMoivre's theorem.

- A $-4(\cos 180^\circ + i \sin 180^\circ)$
 B $4(\cos 60^\circ + i \sin 60^\circ)$
 C $4(\cos 120^\circ + i \sin 120^\circ)$
 D $64(\cos 60^\circ + i \sin 60^\circ)$

$\sqrt[3]{-64} = (-64)^{1/3} = [64(\cos 180^\circ + i \sin 180^\circ)]^{1/3}$
 $[64]^{1/3} [\cos(\frac{1}{3} \cdot 180) + i \sin(\frac{1}{3} \cdot 180)]$
 $4(\cos 60 + i \sin 60)$
 $\frac{180}{3} = 60$

36. Write an explicit formula for the arithmetic sequence: $-6, -2, 2, 6, \dots$

- A $-4n-2$
 B $4n-2$
 C $4n-7$
 D $4n-10$

arithmetic
 $a_n = a_1 + d(n-1)$
 $a_n = -6 + 4(n-1)$
 $= -6 + 4n - 4$
 $= 4n - 10$

37. Write an explicit formula for the arithmetic sequence with a first term of 15 and a common difference of 4.

- A $4 + (n-1)15$
- B $4 - (n-1)15$
- C $15 + (n-1)4$
- D $15 - (n-1)4$

$$a_n = 15 + 4(n-1)$$

38. Find the 90th term of the arithmetic sequence with $a_1 = 3$ and $a_2 = 9$. (Assume that n begins with 1)

- A -531
- B 273
- C 337
- D 804

$$n = 6$$

$$a_n = 3 + 6(n-1)$$

$$a_{90} = 3 + 6(90-1)$$

39. Find the sum of the first 100 terms of the arithmetic sequence whose n th term is $a_n = 9n - 6$. (Assume that n begins with 1).

- A 894
- B 44,550
- C 44,850
- D 49,700

$$S_{100} = \frac{100}{2}(a_1 + a_{100})$$

$$= 50(3 + 894)$$

$$a_1 = 9(1) - 6 = 3$$

$$a_{100} = 9(100) - 6 = 894$$

40. Find the sum: $\sum_{n=2}^7 \frac{2}{n+3} = \frac{2}{5} + \frac{2}{6} + \frac{2}{7} + \frac{2}{8} + \frac{2}{9} + \frac{2}{10}$

- A $\frac{12}{45}$
- B $\frac{2131}{1260}$
- C $\frac{2761}{1260}$
- D $\frac{179}{10}$

41. Evaluate: $\sum_{n=1}^{\infty} 5\left(\frac{2}{3}\right)^{n-1}$

- A 3
- B $\frac{10}{3}$
- C $\frac{15}{2}$
- D 15

$|r| < 1$ compare to $\frac{a_1}{1-r} = \frac{5}{1-\frac{2}{3}} = \frac{5}{\frac{1}{3}} = 15$

$$= 5\left(\frac{2}{3}\right)^0 = 5$$

42. Find the coefficient of x^3y^3 in the expansion of $(3x-2y)^6 = \sum_{k=0}^6 \binom{6}{k} (3x)^k (-2y)^{6-k}$

- A -25920
- B 4320
- C -216
- D 20

$$\binom{6}{3} (3x)^3 (-2y)^3$$

$$= 20 (27x^3) (-8y^3)$$

$$= -4320 x^3 y^3$$

43. Find the coefficient of x^7y^2 in the expansion of $(x+4y)^9 = \sum_{k=0}^9 \binom{9}{k} (x)^k (4y)^{9-k}$

A 16
 B 36
 C 376
 D 1152

$\binom{9}{2} (x)^7 (4y)^2$
 $36 \times 16y^2$
 $576x^7y^2$

44. A card is drawn at random from a standard deck of 52 playing cards. Find the probability that the card is a face card.

A $\frac{1}{13}$
 B $\frac{3}{13}$
 C $\frac{1}{4}$
 D $\frac{4}{13}$

$\frac{12}{52}$

45. A password is comprised of 3 letters followed by 4 digits. How many passwords are possible?

A 118
 B 26,000,000
 C 175,760,000
 D 456,976,000

$26 \ 26 \ 26 \ 10 \ 10 \ 10 \ 10$
 $175,760,000$

46. A phone number has seven digits. How many different telephone numbers are possible if it cannot begin with 0 or 1?

A 5040
 B 604,800
 C 2,097,152
 D 8,000,000

$8 \ 10 \ 10 \ 10 \ 10 \ 10 \ 10$
 $8,000,000$

47. A bag contains 9 quarters, 5 dimes, and 3 nickels. If three coins are selected without replacement, what is the probability of selecting three quarters?

A $\frac{1}{504}$
 B $\frac{504}{4913}$
 C $\frac{21}{170}$
 D $\frac{763}{510}$

$\frac{9}{17} \cdot \frac{8}{16} \cdot \frac{7}{15}$
 $11235 \rightarrow \frac{21}{170}$

48. A class is given a list of 20 study questions from which 12 will be part of their upcoming final. If a given student knows how to solve 15 of the problems, find the probability that the student will be able to answer 10 questions correctly.

A $\frac{455}{184756}$
 B $\frac{77}{3230}$
 C $\frac{77}{323}$
 D $\frac{5}{6}$

knows 15
 doesn't know 5
 # ways to pick 12 questions (10 right, 2 wrong)
 $\binom{15}{10} \cdot \binom{5}{2}$
 $3003 \cdot 10 = 30030$

total # ways to pick 12 questions = $\binom{20}{12} = 125970$

$P(\text{exactly 10 right}) = \frac{30030}{125970} = .238 \approx \frac{77}{323}$

49. A drama teacher must fill extra roles for 7 females and 5 males for the upcoming school production of "Cats". If 10 females and 8 males tryout and all are equally qualified, in how many ways can the teacher choose the cast?

A 35
 B 80
 C 176
 D 720

$C = 7, C = 5$
 $120 \cdot 56$

50. Match the graph with the correct system of inequalities.

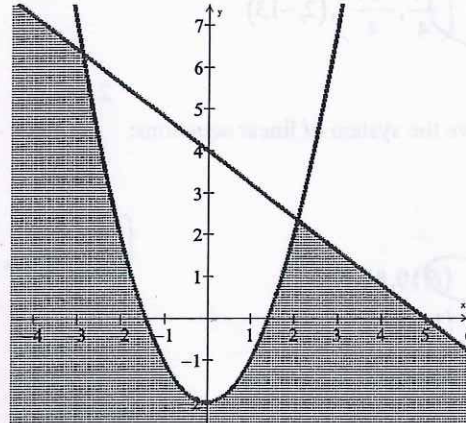
A $\begin{cases} 4x + 5y \leq 20 \\ y \leq x^2 - 2 \end{cases}$

B $\begin{cases} 4x + 5y \geq 20 \\ y \geq x^2 - 2 \end{cases}$

C $\begin{cases} 4x + 5y \geq 20 \\ y \leq x^2 - 2 \end{cases}$

D $\begin{cases} 4x + 5y \leq 20 \\ y \geq x^2 - 2 \\ y \geq -2 \end{cases}$

$0, y$ should not write



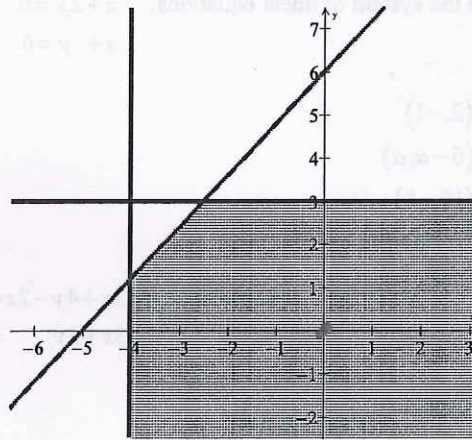
51. Graph the system of inequalities.

A $\begin{cases} 6x - 5y \geq -30 \\ x \geq -4 \\ y \leq 3 \end{cases}$

B $\begin{cases} 6x - 5y \leq -30 \\ x \geq -4 \\ y \leq 3 \end{cases}$

C $\begin{cases} 6x - 5y \leq -30 \\ x \leq -4 \\ y \geq 3 \end{cases}$

D $\begin{cases} 6x - 5y \geq -30 \\ x \geq -4 \\ y \geq 3 \end{cases}$



52. A small business invests \$16,000 to produce an item that will sell for \$5.95. Each unit can be produced for \$3.45. Find the sales necessary to break even.

A 640
 B 1702
 C 6400
 D 64,000

$5.95x = 3.45x + 16000$
 $2.5x = 16000$

53. Solve the following system by the method of Substitution:

- A (2, -13)
- B $(\frac{-7}{4}, 2)$
- C $(\frac{7}{4}, \frac{-51}{4}), (-2, -9)$
- D $(\frac{-7}{4}, \frac{-37}{4}), (2, -13)$**

$$\begin{aligned} 4x^2 + y &= 3 \\ x + y &= -11 \end{aligned}$$

$$y = 3 - 4x^2$$

$$x + 3 - 4x^2 = -11$$

$$-4x^2 + x + 14 = 0$$

$$x = \frac{-1 \pm \sqrt{1 - 4(-4)(14)}}{2(-4)} = -1 \pm \sqrt{\dots}$$

54. Solve the system of linear equations:

$$\begin{aligned} 2x - y + 3z &= 26 \\ 2y - z &= 12 \\ 7x - 5y &= -8 \end{aligned}$$

- A (6, 10, 8)**
- B (11, 8, 4)
- C (16, 6, 0)
- D (21, 4, -4)

$$\begin{bmatrix} 2 & -1 & 3 \\ 0 & 2 & -1 \\ 7 & -5 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 26 \\ 12 \\ -8 \end{bmatrix}$$

$$\begin{aligned} x &= \frac{-1 \pm 15}{-8} = \frac{-14}{8} = -\frac{7}{4} \\ -\frac{7}{4} + y &= -11 \implies y = -\frac{37}{4} \\ -7 + 4y &= 44 \implies 4y = 51 \implies y = \frac{51}{4} \\ 2 + y &= -11 \implies y = -13 \end{aligned}$$

55. Solve the system of linear equations:

$$\begin{aligned} 3x - 2y &= 8 \\ x + 2y &= 0 \\ x + y &= 6 \end{aligned}$$

- A (2, -1)
- B (6-a, a)
- C (12, -6)
- D no solution**

$$\begin{bmatrix} 3 & -2 \\ 1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 8 \\ 0 \end{bmatrix}$$

check $2, -1$
 $2 - 1 = 6 \neq 6$

56. Solve the system of linear equations:

$$\begin{aligned} 2x + 4y - 2z &= 0 \\ 3x + 5y &= 1 \end{aligned}$$

- A $(-5a + 2, 3a - 1, a)$**
- B $(5a + 2, -3a - 1, a)$
- C (2, 1, 4)
- D no solution

$$\begin{bmatrix} 2 & 4 & -2 & | & 0 \\ 3 & 5 & 0 & | & 1 \end{bmatrix}$$

$$\frac{1}{2}R_1 \begin{bmatrix} 1 & 2 & -1 & | & 0 \\ 3 & 5 & 0 & | & 1 \end{bmatrix}$$

$$-3R_1 + R_2 \begin{bmatrix} 1 & 2 & -1 & | & 0 \\ 0 & -1 & 3 & | & 1 \end{bmatrix}$$

$$\begin{aligned} z &= a \\ -y + 3(a) &= 1 \implies y = 3a - 1 \\ x + 2(3a - 1) - a &= 0 \implies x + 6a - 2 - a = 0 \implies x + 5a - 2 = 0 \implies x = -5a + 2 \end{aligned}$$

57. Given: $A = \begin{bmatrix} 8 & -1 \\ 2 & 3 \\ -4 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 6 \\ -1 & -5 \\ 1 & 10 \end{bmatrix}$ Find: $6B-5A$

A $\begin{bmatrix} -34 & 41 \\ -16 & -45 \\ 26 & 35 \end{bmatrix}$

B $\begin{bmatrix} 43 & -36 \\ 17 & 43 \\ -29 & -20 \end{bmatrix}$

C $\begin{bmatrix} 53 & 24 \\ 7 & -7 \\ -19 & 80 \end{bmatrix}$

D $\begin{bmatrix} 46 & 31 \\ 4 & -15 \\ -14 & 85 \end{bmatrix}$

58. Find the product of matrices: $\begin{bmatrix} 9 & 2 & 5 \\ 1 & 0 & 3 \\ 6 & 2 & -4 \end{bmatrix} \begin{bmatrix} 4 & -2 & 7 \\ -7 & 1 & 0 \\ -2 & 2 & 8 \end{bmatrix}$

A $\begin{bmatrix} 12 & -6 & 103 \\ -2 & 4 & 31 \\ 18 & -18 & 10 \end{bmatrix}$

B $\begin{bmatrix} 36 & -4 & 35 \\ -7 & 0 & 0 \\ -12 & 4 & -32 \end{bmatrix}$

C $\begin{bmatrix} 36 & -2 & 42 \\ -14 & 0 & 0 \\ -10 & 6 & -32 \end{bmatrix}$

D $\begin{bmatrix} 76 & 22 & -14 \\ -62 & -14 & -32 \\ 32 & 12 & -36 \end{bmatrix}$

59. Given: $A = \begin{bmatrix} 6 & 15 \\ -8 & -3 \end{bmatrix}$, Find A^{-1}

A $\begin{bmatrix} -\frac{1}{34} & -\frac{5}{34} \\ \frac{4}{51} & \frac{1}{17} \end{bmatrix}$

B $\begin{bmatrix} \frac{1}{6} & \frac{1}{15} \\ -\frac{1}{8} & -\frac{1}{3} \end{bmatrix}$

C $\begin{bmatrix} \frac{1}{46} & \frac{5}{46} \\ -\frac{4}{69} & -\frac{1}{23} \end{bmatrix}$

D $\begin{bmatrix} -6 & -15 \\ 8 & 3 \end{bmatrix}$

60. Find the determinant of the matrix: $\begin{bmatrix} 10 & 8 & 3 & -7 \\ 4 & 0 & 5 & -6 \\ 0 & 3 & 2 & 7 \\ 1 & 0 & -3 & 2 \end{bmatrix}$

- A** -2163
- B** 1167
- C** -453
- D** -399

Name _____

Period _____

Spring Semester Multiple Choice Final Exam Review – Honors Algebra 3-41 a. Convert to degrees: $\theta = \frac{11\pi}{8}$ radians.

- A 1.35°
- B 67.5°
- C 123.75°
- D 247.5°

b. Convert to radians: $\theta = 245^\circ$, leave answer in terms of π .

- A $\frac{13\pi}{36}$
- B $\frac{49\pi}{72}$
- C $\frac{49\pi}{36}$
- D $\frac{49\pi}{18}$

2. If the cotangent of an acute angle is $\frac{3}{4}$, find the value of the cosecant.

- A $\frac{3}{5}$
- B $\frac{4}{5}$
- C $\frac{5}{4}$
- D $\frac{5}{3}$

3. Find the reference angle for $\theta = 230^\circ$.

- A -50°
- B 40°
- C 50°
- D 130°

4. Given the $\tan \theta = 2.5849$, find θ .

- A $.0451^\circ$
- B 1.2017°
- C 21.1496°
- D 68.8504°

5. Given $\tan \theta = \frac{24}{7}$ and $\sec \theta < 0$, find $\sin \theta$.

- A $\frac{-24}{25}$
- B $\frac{-7}{25}$
- C $\frac{7}{25}$
- D $\frac{24}{25}$

6. Given $\cos\theta = \frac{2}{7}$ and $\cot\theta < 0$, find $\sin\theta$.

A $\frac{-\sqrt{53}}{7}$

B $\frac{-3\sqrt{5}}{7}$

C $\frac{3\sqrt{5}}{7}$

D $\frac{\sqrt{53}}{7}$

7. A 20 foot ladder rests on the side of a building. If the ladder is 8 feet from the base of the building, find the angle of elevation that the ladder makes with the ground to the nearest degree.

A 22°

B 24°

C 66°

D 68°

8. From fire tower A, a fire with bearing $N78^\circ E$ is sighted. The same fire is sighted from tower B with bearing $N51^\circ W$. Tower B is 70 miles directly east of tower A. How far, to the nearest mile, is it from tower A to the fire?

A 19 miles

B 57 miles

C 70 miles

D 88 miles

9. Find the exact value of the expression: $\sin\left[\tan^{-1}\left(\frac{-12}{5}\right)\right]$

A $\frac{-12}{13}$

B $\frac{-5}{13}$

C $\frac{5}{13}$

D $\frac{12}{13}$

10. Find the exact value of the expression: $\csc\left[\cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)\right]$

A -2

B $\frac{-\sqrt{21}}{7}$

C $\frac{\sqrt{21}}{7}$

D 2

11. Find the period in degrees: $f(x) = \sin\left(\frac{1}{3}x\right)$

A 60°

B 120°

C 540°

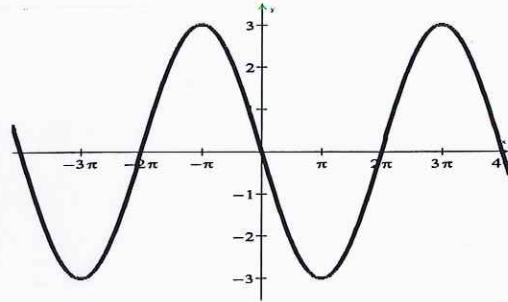
D 1080°

12. Find the period in degrees: $f(x) = \cos(4x)$

- A 45°
- B 90°
- C 720°
- D 1440°

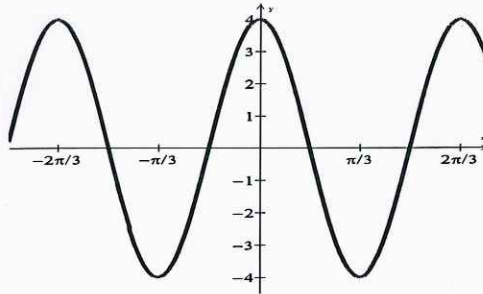
13. Write the sine equation for the following:

- A $y = -3\sin\left(\frac{\theta}{2}\right)$
- B $y = -3\sin(2\theta)$
- C $y = 3\sin\left(\frac{\theta}{2}\right)$
- D $y = 3\sin(2\theta)$



14. Write the cosine equation for the following:

- A $y = -4\cos\left(\frac{\theta}{3}\right)$
- B $y = -4\cos(3\theta)$
- C $y = 4\cos\left(\frac{\theta}{3}\right)$
- D $y = 4\cos(3\theta)$



15. Simplify: $\csc^4 x - \cot^4 x$

- A $\csc^2 x - \cot^2 x$
- B $\csc^2 x + \cot^2 x$
- C $2\cot^2 x - 1$
- D $2\csc^2 x + 1$

16. Simplify: $\frac{\sec x - \cos x}{\tan^2 x}$

- A -1
- B 1
- C $\sin x$
- D $\cos x$

17. Perform the addition and simplify: $\frac{\csc x}{\sin x} - \frac{\cot x}{\tan x}$

- A -1
- B 0
- C 1
- D $\sin^2 x - \tan^2 x$

18. Perform the subtraction and simplify: $\tan x - \frac{\sec^2 x}{\tan x}$

- A $-\cot x$
- B $-\tan x$
- C $\cot x$
- D $\tan x$

19. Find all solutions in the interval $[0, 2\pi)$: $2\sin x + \sqrt{3} = 0$

A $\frac{\pi}{6}, \frac{5\pi}{6}$

B $\frac{\pi}{3}, \frac{2\pi}{3}$

C $\frac{7\pi}{6}, \frac{11\pi}{6}$

D $\frac{4\pi}{3}, \frac{5\pi}{3}$

20. Find all solutions in the interval $[0, 2\pi)$: $\tan x \sec x = \tan x$

A 0

B 0, 1

C 0, π

D $0, \frac{\pi}{2}, \pi$

21. Find all solutions in the interval $[0, 2\pi)$: $\csc^2 x - \csc x = 2$

A $\frac{\pi}{6}, \frac{3\pi}{2}$

B $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$

C $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$

D 2, -1

22. Find all solutions in the interval $[0, 2\pi)$: $2\cos^2 x + 3\cos x + 1 = 0$

A $\frac{\pi}{6}, \frac{11\pi}{6}, 0$

B $\frac{\pi}{3}, \frac{5\pi}{3}, 0$

C $\frac{5\pi}{6}, \frac{7\pi}{6}, \pi$

D $\frac{2\pi}{3}, \frac{4\pi}{3}, \pi$

23. Evaluate: $\sin 165^\circ$ (Use the fact that $165^\circ = 135^\circ + 30^\circ$).

A $\frac{\sqrt{2} - \sqrt{6}}{4}$

B $\frac{\sqrt{6} - \sqrt{2}}{4}$

C $\frac{\sqrt{6} + \sqrt{2}}{4}$

D $\frac{1 + \sqrt{3}}{2}$

24. Write the expression as the sine, cosine, or tangent of an angle: $\cos 125^\circ \cos 40^\circ - \sin 125^\circ \sin 40^\circ$

- A $\cos 85^\circ$
- B $\sin 85^\circ$
- C $\cos 165^\circ$
- D $\sin 165^\circ$

25. Given $\sec u = \frac{-5}{4}$, $\frac{\pi}{2} < u < \pi$ and $\cot v = \frac{-15}{8}$, $\frac{3\pi}{2} < v < 2\pi$, find $\sin(u-v)$.

- A $\frac{-36}{85}$
- B $\frac{13}{85}$
- C $\frac{77}{85}$
- D $\frac{91}{85}$

26. Given $\csc u = \frac{13}{12}$, $0 < u < \frac{\pi}{2}$ and $\tan v = \frac{7}{24}$, $\pi < v < \frac{3\pi}{2}$, find $\cos(u-v)$.

- A $\frac{-204}{325}$
- B $\frac{-187}{325}$
- C $\frac{-36}{325}$
- D $\frac{437}{325}$

27. Find the area of the triangle to the nearest tenth, with sides of length, 43, 53, and 72.

- A 123.5
- B 1131.9
- C 3712.6
- D 15,099.6

28. In $\triangle ABC$, $BC = 6$, $AC = 10$ and $m\angle C = 120^\circ$. What is the area of $\triangle ABC$?

- A 15
- B $15\sqrt{3}$
- C 30
- D $30\sqrt{3}$

29. Given a triangle with sides $a = 55$, $b = 25$, and $c = 72$, find $m\angle C$.

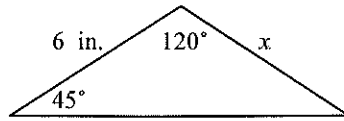
- A 17
- B 39
- C 56
- D 124

30. Given a triangle with $A=109^\circ$, $b=13$, and $c=10$, find a .

- A 18.81
- B 20.47
- C 23.16
- D 353.65

31. Solve for x in the given triangle.

- A 2.20 in.
- B 4.39 in.
- C 7.85 in.
- D 16.39 in.



32. Find all possible measures for angle B, given: $A = 58^\circ$, $a = 11.4$, and $b = 12.8$

- A 72°
- B 108°
- C Both A and B
- D no triangle exists

33. Rewrite the following in trigonometric form of $5i$.

- A $5(\cos 0 + i \sin 0)$
- B $5\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)$
- C $5(\cos \pi + i \sin \pi)$
- D $5\left(\cos \frac{3\pi}{2} + i \sin \frac{3\pi}{2}\right)$

34. Use DeMoivre's theorem to evaluate: $[3(\cos 80^\circ + i \sin 80^\circ)]^4$

- A $3(\cos 320^\circ + i \sin 320^\circ)$
- B $12(\cos 320^\circ + i \sin 320^\circ)$
- C $81(\cos 80^\circ + i \sin 80^\circ)$
- D $81(\cos 320^\circ + i \sin 320^\circ)$

35. Determine which of the following is a cube root of -64 using DeMoivre's theorem.

- A $-4(\cos 180^\circ + i \sin 180^\circ)$
- B $4(\cos 60^\circ + i \sin 60^\circ)$
- C $4(\cos 120^\circ + i \sin 120^\circ)$
- D $64(\cos 60^\circ + i \sin 60^\circ)$

36. Write an explicit formula for the arithmetic sequence: -6, -2, 2, 6, ...

- A $-4n-2$
- B $4n-2$
- C $4n-7$
- D $4n-10$

37. Write an explicit formula for the arithmetic sequence with a first term of 15 and a common difference of 4.
- A $4 + (n - 1)15$
 B $4 - (n - 1)15$
 C $15 + (n - 1)4$
 D $15 - (n - 1)4$
38. Find the 90th term of the arithmetic sequence with $a_1 = 3$ and $a_2 = 9$. (Assume that n begins with 1)
- A -531
 B 273
 C 537
 D 804
39. Find the sum of the first 100 terms of the arithmetic sequence whose n th term is $a_n = 9n - 6$. (Assume that n begins with 1).
- A 894
 B 44,550
 C 44,850
 D 49,700
40. Find the sum: $\sum_{n=2}^7 \frac{2}{n+3}$
- A $\frac{12}{45}$
 B $\frac{2131}{1260}$
 C $\frac{2761}{1260}$
 D $\frac{179}{10}$
41. Evaluate: $\sum_{n=1}^{\infty} 5\left(\frac{2}{3}\right)^{n-1}$
- A 3
 B $\frac{10}{3}$
 C $\frac{15}{2}$
 D 15
42. Find the coefficient of x^3y^3 in the expansion of $(3x - 2y)^6$
- A -25920
 B -4320
 C -216
 D 20

43. Find the coefficient of x^7y^2 in the expansion of $(x+4y)^9$
- A 16
 - B 36
 - C 576
 - D 1152
44. A card is drawn at random from a standard deck of 52 playing cards. Find the probability that the card is a face card.
- A $\frac{1}{13}$
 - B $\frac{3}{13}$
 - C $\frac{1}{4}$
 - D $\frac{4}{13}$
45. A password is comprised of 3 letters followed by 4 digits. How many passwords are possible?
- A 118
 - B 26,000,000
 - C 175,760,000
 - D 456,976,000
46. A phone number has seven digits. How many different telephone numbers are possible if it cannot begin with 0 or 1?
- A 5040
 - B 604,800
 - C 2,097,152
 - D 8,000,000
47. A bag contains 9 quarters, 5 dimes, and 3 nickels. If three coins are selected without replacement, what is the probability of selecting three quarters?
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 - B $\frac{77}{3230}$
 - C $\frac{77}{323}$
 - D $\frac{5}{6}$

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 C 176
 D 6720

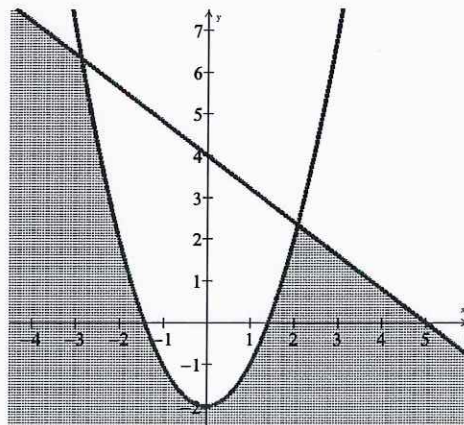
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B $\begin{cases} 4x + 5y \geq 20 \\ y \geq x^2 - 2 \end{cases}$

C $\begin{cases} 4x + 5y \geq 20 \\ y \leq x^2 - 2 \end{cases}$

D $\begin{cases} 4x + 5y \leq 20 \\ y \geq x^2 - 2 \end{cases}$



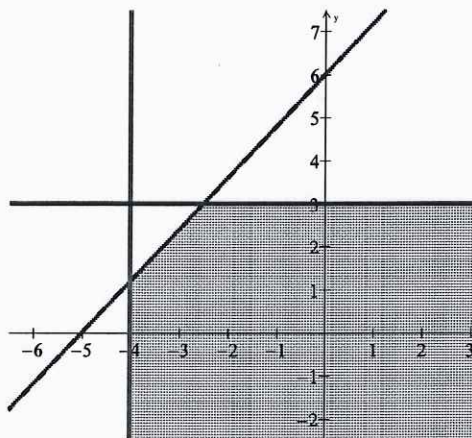
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 B 1702
 C 6400
 D 64,000

53. Solve the following system by the method of Substitution:

$$4x^2 + y = 3$$

$$x + y = -11$$

- A $(2, -13)$
B $\left(\frac{-7}{4}, 2\right)$
C $\left(\frac{7}{4}, \frac{-51}{4}\right), (-2, -9)$
D $\left(\frac{-7}{4}, \frac{-37}{4}\right), (2, -13)$

54. Solve the system of linear equations:

$$2x - y + 3z = 26$$

$$2y - z = 12$$

$$7x - 5y = -8$$

- A $(6, 10, 8)$
B $(11, 8, 4)$
C $(16, 6, 0)$
D $(21, 4, -4)$

55. Solve the system of linear equations:

$$3x - 2y = 8$$

$$x + 2y = 0$$

$$x + y = 6$$

- A $(2, -1)$
B $(6 - a, a)$
C $(12, -6)$
D no solution

56. Solve the system of linear equations:

$$2x + 4y - 2z = 0$$

$$3x + 5y = 1$$

- A $(-5a + 2, 3a - 1, a)$
B $(5a + 2, -3a - 1, a)$
C $(2, 1, 4)$
D no solution

57. Given: $A = \begin{bmatrix} 8 & -1 \\ 2 & 3 \\ -4 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 6 \\ -1 & -5 \\ 1 & 10 \end{bmatrix}$ Find: $6B-5A$

A $\begin{bmatrix} -34 & 41 \\ -16 & -45 \\ 26 & 35 \end{bmatrix}$

B $\begin{bmatrix} 43 & -36 \\ 17 & 43 \\ -29 & -20 \end{bmatrix}$

C $\begin{bmatrix} 53 & 24 \\ 7 & -7 \\ -19 & 80 \end{bmatrix}$

D $\begin{bmatrix} 46 & 31 \\ 4 & -15 \\ -14 & 85 \end{bmatrix}$

58. Find the product of matrices: $\begin{bmatrix} 9 & 2 & 5 \\ 1 & 0 & 3 \\ 6 & 2 & -4 \end{bmatrix} \begin{bmatrix} 4 & -2 & 7 \\ -7 & 1 & 0 \\ -2 & 2 & 8 \end{bmatrix}$

A $\begin{bmatrix} 12 & -6 & 103 \\ -2 & 4 & 31 \\ 18 & -18 & 10 \end{bmatrix}$

B $\begin{bmatrix} 36 & -4 & 35 \\ -7 & 0 & 0 \\ -12 & 4 & -32 \end{bmatrix}$

C $\begin{bmatrix} 36 & -2 & 42 \\ -14 & 0 & 0 \\ -10 & 6 & -32 \end{bmatrix}$

D $\begin{bmatrix} 76 & 22 & -14 \\ -62 & -14 & -32 \\ 32 & 12 & -36 \end{bmatrix}$

59. Given: $A = \begin{bmatrix} 6 & 15 \\ -8 & -3 \end{bmatrix}$, Find A^{-1}

A $\begin{bmatrix} \frac{-1}{34} & \frac{-5}{34} \\ \frac{4}{51} & \frac{1}{17} \end{bmatrix}$

B $\begin{bmatrix} \frac{1}{6} & \frac{1}{15} \\ \frac{-1}{8} & \frac{-1}{3} \end{bmatrix}$

C $\begin{bmatrix} \frac{1}{46} & \frac{5}{46} \\ \frac{-4}{69} & \frac{-1}{23} \end{bmatrix}$

D $\begin{bmatrix} -6 & -15 \\ 8 & 3 \end{bmatrix}$

60. Find the determinant of the matrix: $\begin{bmatrix} 10 & 8 & 3 & -7 \\ 4 & 0 & 5 & -6 \\ 0 & 3 & 2 & 7 \\ 1 & 0 & -3 & 2 \end{bmatrix}$

- A** -2163
- B** -1167
- C** -453
- D** -399

Spring Multiple Choice Answer Key
(13 A's; 15 B's; 16 C's; 17 D's)

1. D, C	11. D	21. B	31. D	41. D	51. A
2. C	12. B	22. D	32. C	42. B	52. C
3. C	13. A	23. B	33. B	43. C	53. D
4. D	14. D	24. C	34. D	44. B	54. A
5. A	15. B	25. B	35. B	45. C	55. D
6. B	16. D	26. A	36. D	46. D	56. A
7. C	17. C	27. B	37. C	47. C	57. A
8. B	18. A	28. B	38. C	48. C	58. A
9. A	19. D	29. D	39. C	49. D	59. A
10. D	20. C	30. A	40. B	50. A	60. B