HAlg34 2012-2013 Fall final review (multiple choice) key

(1a) $2x^2-7x-15$

M	A
-30	-7
$(-10)(3)$	$-10+3$

$\frac{(2x-10)}{2}\frac{(2x+3)}{1}$

$\boxed{(x-5)(2x+3)}$ B

(1b) $25x^2-81y^2$

(a^2-b^2)

$(5x)^2-(9y)^2$

$\boxed{(5x+9y)(5x-9y)}$ D

(2) $10x^2-13x=3$

$10x^2-13x-3=0$

M	A
-30	-13
$(-15)(2)$	$-15+2$

$\frac{(10x-15)}{5}\frac{(10x+2)}{2}$

$(2x-3)(5x+1)=0$

$2x-3=0$ $\quad 5x+1=0$

$2x=3$ $\quad 5x=-1$

$\boxed{x=\frac{3}{2} \quad x=\frac{-1}{5}}$ D

(3) $2x^2-6x+3=0$

quadratic formula $a=2, b=-6, c=3$

$x=\frac{-(-6)\pm\sqrt{(-6)^2-4(2)(3)}}{2(2)}$

$x=\frac{6\pm\sqrt{36-24}}{4}$

$x=\frac{6\pm\sqrt{12}}{4}=\frac{6\pm\sqrt{4}\sqrt{3}}{4}$

$x=\frac{6\pm2\sqrt{3}}{4}=\frac{2(3\pm\sqrt{3})}{2(2)}$

$\boxed{x=\frac{3\pm\sqrt{3}}{2}, C}$

(4) $(2x+6)^2=28$

$\sqrt{(2x+6)^2}=\pm\sqrt{28}$

$2x+6=\pm\sqrt{4}\sqrt{7}$

$2x+6=\pm2\sqrt{7}$

$2x=-6\pm2\sqrt{7}$

$\boxed{x=-3\pm\sqrt{7}, A}$

(5) $\sqrt{2x+7}-x=2$

$\sqrt{2x+7}=x+2$

$(\sqrt{2x+7})^2=(x+2)^2$ note: $(x+2)^2\neq x^2+4$!

$2x+7=x^2+4x+4$

$-2x \quad -7 \quad -2x \quad -7$

$x^2+2x-3=0$

M	A
-3	2
$(3)(-1)$	$3-1$

$(x+3)(x-1)=0$

$x+3=0 \quad x-1=0$

$x=-3 \quad x=1$

checking:

$\sqrt{2(-3)+7}-(-3)\stackrel{?}{=}2$

$\sqrt{-6+7}+3=2$

$\sqrt{1}+3=2$

$4=2$

no (extraneous)

$\sqrt{2(1)+7}-(1)\stackrel{?}{=}2$

$\sqrt{9}-1=2$

$3-1=2$

$2=2$

yes

$\boxed{x=1, B}$

(6) $\sqrt{x-16}-1=2$

$\sqrt{x-16}=3$

$(\sqrt{x-16})^2=(3)^2$

$x-16=9$

$x=25$

checking: $\sqrt{(25)-16}-1=2$

$\sqrt{9}-1=2$

$3-1=2$

$2=2$

$\boxed{x=25, D}$

(7) $\frac{2x}{x-3} - \frac{2}{1} = \frac{6}{x^2-9}$

list: $x-3$, $x+3$

$\frac{2x}{x-3} - \frac{2}{1} = \frac{6}{(x+3)(x-3)}$

$\frac{2x(x-3)(x+3)}{x-3} - \frac{2(x-3)(x+3)}{1} = \frac{6(x-3)(x+3)}{(x+3)(x-3)}$

$2x(x+3) - 2(x-3)(x+3) = 6$

$2x^2+6x-2(x^2-9) = 6$

$2x^2+6x-2x^2+18 = 6$

$-18 \quad -18$

$6x = -12$

$\boxed{x=-2, B}$

(8) $\frac{1}{x-2} + \frac{3}{x+3} = \frac{4}{x^2+x-6}$

$\frac{1}{x-2} + \frac{3}{x+3} = \frac{4}{(x-2)(x+3)}$

list: $x-2$, $x+3$

$\frac{1(x-2)(x+3)}{x-2} + \frac{3(x-2)(x+3)}{x+3} = \frac{4(x-3)(x+3)}{(x-2)(x+3)}$

$x+3+3(x-2) = 4$

$x+3+3x-6 = 4$

$4x-3 = 4$

$4x = 7$

$\boxed{x = \frac{7}{4}, D}$

(9) $\frac{1}{2}|2x-6| \geq 16$

isolate

$|2x-6| \geq 32$

↑ outside case, 2 inequalities

$2x-6 \leq -32$ or $2x-6 \geq 32$

$2x \leq -26$ $\quad 2x \geq 38$

$x \leq -13$ $\quad x \geq 19$

$\boxed{(-\infty, -13] \cup [19, \infty), B}$

(10) $\frac{1}{4}|5x+2| < 7$

$|5x+2| < 28$

↑ inside case, double inequality

$-28 < 5x+2 < 28$

$-2 \quad -2 \quad -2$

$-30 < 5x < 26$

$\frac{-30}{5} < \frac{5x}{5} < \frac{26}{5}$

$-6 < x < \frac{26}{5}$

$\boxed{(-6, \frac{26}{5}), C}$

(11a) $\left(\frac{27}{8}\right)^{-\frac{5}{3}}$

$\left(\frac{8}{27}\right)^{\frac{5}{3}}$

$\left[\left(\frac{8}{27}\right)^{\frac{1}{3}}\right]^5$

$\left(\frac{\sqrt[3]{8}}{\sqrt[3]{27}}\right)^5$

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

$\frac{2^5}{3^5}$

$\boxed{\frac{32}{243}, C}$

(11b) $(6x^3y^2)^3(3x)^{-3}$

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

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

$\frac{216x^9y^6}{27x^3}$

$\frac{8x^6y^6}{1} = \boxed{8x^6y^6, C}$

(12) $g(x)=2x^3-8x^2-2x+5$, $g(-3)$

plug in:

$g(-3)=2(-3)^3-8(-3)^2-2(-3)+5$

$=2(-27)-8(9)+6+5$

$=-54-72+6+5$

$=\boxed{-115\ A}$

or synth division:

-3 | 2 −8 −2 5

−6 42 −120

2 −14 40 | −115

answer is remainder

(13) $f(x)=4-x^2$ $g(x)=x+2$

$f(g(x))=f(x+2)=4-(x+2)^2$

$=4-(x^2+4x+4)$

$=4-x^2-4x-4$

$=\boxed{-x^2-4x,\ A}$

(14) $f(x)=x^2+4x+5$ $g(x)=x-7$

$3g(f(-2))$

$3g(1)$

$3(-6)$

$\boxed{-18,\ B}$

$f(-2)=(-2)^2+4(-2)+5$

$=4-8+5$

$=1$

$g(1)=(1)-7=-6$

(15) $f(x)=3x^2+7x-2$ $g(x)=4x+3$

$(g-f)(x)=g(x)-f(x)$

$=(4x+3)-(3x^2+7x-2)$

$=4x+3-3x^2-7x+2$

$=\boxed{-3x^2-3x+5,\ A}$

(16) $f(x)=\frac{2x}{\sqrt{x+4}}$

D: $x+4>0$ (not $\geq$, due to fraction)

$x>-4$

$\boxed{(-4,\infty)\ B}$

(17) $(x+1)(x^2-4)>0$

$(x+1)(x+2)(x-2)>0$

critical #'s $-2, -1, 2$

table or calculator: which regions between critical #'s are >0?

int.	test pt	test	>0?
$(-\infty,-2)$	-3	$(-)(-)(-)=-$	no
$(-2,-1)$	$-\frac{3}{2}$	$(-)(+)(-)=+$	yes
$(-1,2)$	0	$(+)(+)(-)=-$	no
$(2,\infty)$	3	$(+)(+)(+)=+$	yes

$\boxed{(-2,-1)\cup(2,\infty),\ D}$

(can also plot to find x intervals where >0)

(18) $f(x)=x^3$ to $g(x)=(x+5)^3-9$

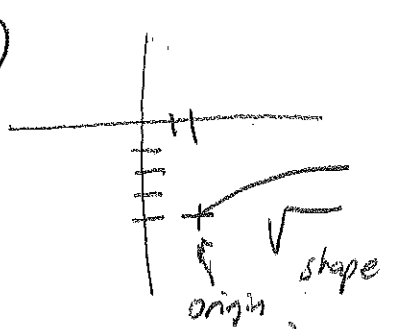
$\boxed{\text{down } 9,\ \text{left } 5,\ C}$

(19) $f(x)=x^2$ to $g(x)=-\frac{3}{4}(x-8)^2+10$

$\boxed{\text{up } 10,\ 8 \text{ right, flip vert (reflect over x-axis), vertical shrink}}$

$\boxed{D}$

(20)



(2, −4) r+2 down 4

$y = \sqrt{x-2} - 4$

A

(21a) $f(x) = 4x^2 + 8x - 2$

$f(-x) = 4(-x)^2 + 8(-x) - 2$

$f(-x) = 4x^2 - 8x - 2$

neither, D

(21b) $f(x) = |x| + 3$

$f(-x) = |-x| + 3$

$f(-x) = |x| + 3$

$f(-x) = f(x)$

even, A

(21c) $f(x) = x^3 - 2x$

$f(-x) = (-x)^3 - 2(-x)$

$f(-x) = -x^3 + 2x$

$f(-x) = -(x^3 - 2x)$

$f(-x) = -f(x)$

odd, B

(23) $\frac{3x-5}{x+4}$

x-int ($y=0$)

$\frac{3x-5}{x+4} = 0$ fraction = 0 when numerator = 0

$3x - 5 = 0$

$3x = 5$

$x = \frac{5}{3}$

$\left(\frac{5}{3}, 0\right)$ C

(22) inverse of $f(x) = 2x - 3$

$y = 2x - 3$

$x = 2y - 3$

$x + 3 = 2y$

$2y = x + 3$

$y = \frac{1}{2}x + \frac{3}{2}$

$f^{-1}(x) = \frac{1}{2}x + \frac{3}{2}$, B

(24)

$$2x-3 \overline{)\,4x^3 - 8x^2 + 5x - 2}$$

$2x^2 - x + 1$

$-(4x^3 - 6x^2)$

$-2x^2 + 5x$

$-(-2x^2 + 3x)$

$2x - 2$

$-(2x - 3)$

1

$2x^2 - x + 1 + \frac{1}{2x-3}$, A

(25) $(x+1)$ is zero, when $x = -1$

(placeholder for x^2 term)

−1	4	0	−3	5
		−4	4	−1
	4	−4	1	4

$4x^2 - 4x + 1 + \frac{4}{x+1}$, C

(26) $f(x) = \frac{x^2-x}{x+1}$ $n=2$ $m=1$

$n > m$, no horiz. asymptote

$n > m$ by exactly 1, so slant asymptote.

$$x+1 \overline{)\,x^2 - x + 0}$$
$$-(x^2 + x)$$
$$-2x + 0$$
$$-(-2x - 2)$$
$$2$$

$y = x - 2$ is slant asympt.

C

(27) $f(x) = \frac{2x-1}{x}$ $n=1$ $m=1$

$n = m$ horiz asymptote

$y = \frac{2}{1}$

$y = 2$, D

(28) $f(x) = \frac{x-6}{x^2-4}$

Vertical asymptotes occur at holes in domain (where denominator = 0)

$x^2 - 4 = 0$

$(x+2)(x-2) = 0$

$x = 2, x = -2$, A

(29) $\frac{8-7i}{1-2i}$

$\frac{(8-7i)(1+2i)}{(1-2i)(1+2i)}$ ← complex conjugate

$\frac{8+16i-7i-14i^2}{1+2i-2i-4i^2} = \frac{8+9i-14(-1)}{1-4(-1)}$ $(i^2 = -1)$

$\frac{8+9i+14}{1+4} = \frac{22+9i}{5} = \frac{22}{5} + \frac{9}{5}i$, D

(30) $(6-2i)(2-3i)$

$12 - 18i - 4i + 6i^2$

$12 - 22i + 6(-1)$ $(i^2 = -1)$

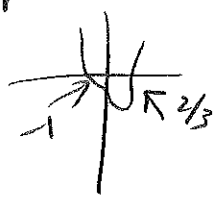
$12 - 22i - 6$

$6 - 22i$, A

(31) real zeros: $f(x) = 6x^4 + 11x^3 + 2x^2 - 5x - 2$

plug in calculator to get a possible zero (x-intercept):

-1 looks like a zero



synth. division to verify:

$-1 \mid 6 \;\; 11 \;\; 2 \;\; -5 \;\; -2$

$\quad\quad -6 \;\; -5 \;\; 3 \;\; 2$

$6 \;\; 5 \;\; -3 \;\; -2 \;\; | \;\; 0$ ✓

2/3 also in all 4 given answers

$\frac{2}{3} \mid 6 \;\; 5 \;\; -3 \;\; -2$

$\quad\quad 4 \;\; 6 \;\; 2$

$6 \;\; 9 \;\; 3 \;\; | \;\; 0$ ✓

resulting quadratic → $6x^2 + 9x + 3 = 0$

factor a 3 out:

$3(2x^2 + 3x + 1) = 0$

$3\frac{(2x+2)(2x+1)}{2} = 0$

$3(x+1)(2x+1) = 0$

$x = -1$ $\quad 2x + 1 = 0$

$2x = -1$ $\quad x = -1/2$

m	4
2	3
(2)(1)	2+1

Zeros: -1 (twice), $\frac{2}{3}$, $-\frac{1}{2}$

C

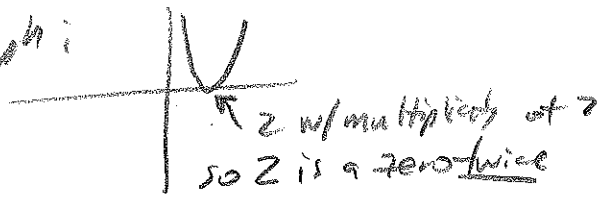
(32) all zeros: $f(x)=x^4-4x^3+8x^2-16x+16$ deg. 4, should have 4 zeros

use calculator or look at answers, all have 2

verify w/ synth. div.

2	1	−4	8	−16
		2	−4	8
	1	−2	4	−8	0 ✓

graph:



divide again by 2:

2	1	−2	4	−8
		2	0	8
	1	0	4	0 ✓

$x^2+4=0$

solve this for complex zeros:

$x^2+4=0$

$x^2=-4$

$x=\pm\sqrt{-4}$

$x=\pm\sqrt{4}\sqrt{-1}$

$x=\pm 2i$

zeros: $2, \pm 2i, C$

(33) zeros @ 2 (m1), 0 (m2), −3 (m2)

$(x-2)(x-0)^2(x+3)^2$

$x^2(x-2)(x+3)^2$

$[x^3-2x^2][x^2+6x+9]$

$x^5+6x^4+9x^3-2x^4-12x^3-18x^2$

$x^5+4x^4-3x^3-18x^2$, B

(34) zeros: −2, 3, 2i (also −2i) conjugate pairs

$(x+2)(x-3)(x-2i)(x+2i)$ $(i^2=-1)$

$[x^2-3x+2x-6][x^2-2xi+2xi-4i^2]$ $(+4)$

$(x^2-x-6)(x^2+4)$

$x^4-x^3-6x^2+4x^2-4x-24$

$x^4-x^3-2x^2-4x-24$, C

(35) zeros from graph

−2 (m1)

2 (m2)

3 (m1)

$(x+2)(x-2)^2(x-3)$ A, B, or D

LH ↑ RH ↗

leading term positive

so B or D

use 'trough' (−1, −6) to test

B: $y=\frac{1}{6}(-1-2)^2(-1+2)(-1-3)$

$y=\frac{1}{6}(-3)^2(1)(-4)=-\frac{9\cdot 4}{6}=-6$ ✓

D: $y=\frac{1}{4}(-1-2)^2(-1+2)(-1-3)$

$=\frac{1}{4}(-3)^2(1)(-4)$ -9 ✗

(36) graph has zeros at:

−1 (m2)

2 (m1)

$(x+1)(x+1)(x-2)$

↑ x−a

so a = −1 B

(37) I. zeros: 1 (m3), −2 (m1) → C

II. zeros: −1 (m3), 2 (m1) → F

III. zeros: −1 (m3), 2 (m1) → A

IV. zeros: −1 (m2), 2 (m1) → E

V zeros: −1 (m2), 2 (m1) → D

VI zeros: 1 (m2), −2 (m1) → B

(38) $\log_a y = x$

$a^x = y$ D

(39) $\log_5 8 = \frac{\log_{10} 8}{\log_{10} 5} =$ 1.292 D

(40) $4\ln 3 - \frac{1}{2}\ln(9)$

$\ln 3^4 - \ln 9^{1/2}$

$\ln 3^4 - \ln 3$

$\ln\left(\frac{3^4}{3}\right)$

$\ln(3^3)$

$\ln(27)$ C

(41) $\log 2 + 3\log 4$

$\log 2 + \log 4^3$

$\log(2 \cdot 4^3)$

$\log(2 \cdot 64)$

$\log 128$, D

(42) $\log \sqrt[5]{\frac{(x-1)^2}{(x-3)(x+2)^3}}$

$\log\left(\frac{(x-1)^2}{(x-3)(x+2)^3}\right)^{1/5}$

$\frac{1}{5}\log\left(\frac{(x-1)^2}{(x-3)(x+2)^3}\right)$

$\frac{1}{5}\left[\log(x-1)^2 - \log(x-3) - \log(x+2)^3\right]$

$\frac{1}{5}\left[2\log(x-1) - \log(x-3) - 3\log(x+2)\right]$, B

(43) $\log\left(\frac{xy^3}{z^2w}\right)^7$

$7\log\left(\frac{xy^3}{z^2w}\right)$

$7(\log x + \log y^3 - \log z^2 - \log w)$

$7(\log x + 3\log y - 2\log z - \log w)$, A

(44) $8^x = 40$

$\log_8 40 = x$

$x = \frac{\log 40}{\log 8}$, D

(45) $5^x = 32$

$\log_5(5^x) = \log_5(32)$

$x = \log_5(32)$

$x = \frac{\log_{10}(32)}{\log_{10}(5)}$

$x \approx 2.15$, C

(46) $4^{2x-7} = 1024$

$4^{2x-7} = 4^5$

$2x - 7 = 5$

$2x = 12$

$x = 6$, C

(47) $9^{5x} = 243^{3x-2}$

$(3^2)^{5x} = (3^5)^{3x-2}$

$(3)^{10x} = (3)^{15x-10}$

$10x = 15x - 10$

$10 = 5x$

$x = 2$, C

(48) $\log 10^{3x-11} = 40$

$\log_{10} 10^{3x-11} = 40$

$3x - 11 = 40$

$3x = 51$

$x = \frac{51}{3} = 17$, D

(49) $\ln e^{5x+3} = 22$

$\log_e e^{5x+3} = 22$

$5x + 3 = 22$

$5x = 19$

$x = \frac{19}{5}$, A

(50) $\log(1-2x) - \log(x-1) = 1$

$\log_{10}\left(\frac{1-2x}{x-1}\right) = 1$

$10^1 = \frac{1-2x}{x-1}$

$\frac{10}{1} = \frac{1-2x}{x-1}$

$10(x-1) = 1(1-2x)$

$10x - 10 = 1 - 2x$

$12x = 11$

$x = \frac{11}{12}$ but $\log(x-1)$

$\log\left(\frac{11}{12} - 1\right)$

$\log\left(-\frac{1}{12}\right)$

not possible

So no sol'n, D

(51) $\log_4 x + \log_4(x+2) = \log_4(3x+56)$

$\log_4(x(x+2)) = \log_4(3x+56)$

$x(x+2) = 3x + 56$

$x^2 + 2x = 3x + 56$

$x^2 - x - 56 = 0$

$(x-8)(x+7) = 0$

$x = 8$, D

$x \neq -7$ ($\log(-7)$)

(52) $P = \$10{,}000$

$r = .062$

t	A
0	$P(10000)$
t	$2P(20000)$

$A = Pe^{rt}$

$A = 10000e^{.062t}$

$\frac{20000}{10000} = \frac{10000}{10000}e^{.062t}$

$2 = e^{.062t}$

$\ln(2) = \ln(e^{.062t})$

$\frac{\ln 2}{.062} = \frac{.062t}{.062}$

$t = \frac{\ln 2}{.062} = 11.18 \text{ yrs}$, D

(53) $P = ?$

$r = .0725$

$t = 6$

$A = 20000$

$n = 4$ (quarterly)

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

$20000 = P\left(1 + \frac{.0725}{4}\right)^{4(6)}$

$P = \frac{20000}{\left(1 + \frac{.0725}{4}\right)^{4(6)}}$

$P = \$12995.82$, B

(54) $A = Pe^{rt}$

t	A
0	P
25	$4P$ ← quadruple

$\frac{4P}{P} = \frac{Pe^{r(25)}}{P}$

$4 = e^{r(25)}$

$\ln 4 = r(25)$

$r = \frac{\ln 4}{25} = .055545$

5.5%, B

(55) I. $5x^2 = 3y - 4$ | 1 sq. term = Parabola, B

II. $7x^2 - 5x + 6y^2 + 7y = 9$ 2 sq terms, same sign, not =, Ellipse C

III. $7x^2 - 5x + 7y^2 + 6y = 9$ 2 sq terms, same sign, =, circle D

IV. $7x^2 - 5x - 7y^2 + 6y = 9$ 2 sq terms, opp sign, Hyperbola A

(56) $2x^2 + 2y^2 - 8x + 12y + 12 = 0$

$(2x^2 - 8x) + (2y^2 + 12y) = -12$

$2(x^2 - 4x + \underline{4}) + 2(y^2 + 6y + \underline{9}) = -12 + \underline{8} + \underline{18}$

$\frac{2(x-2)^2}{2} + \frac{2(y+3)^2}{2} = \frac{24}{2}$

$(x-2)^2 + (y+3)^2 = 12$, A

(57) $x^2 - 2x + 8y = -9$

$x^2 - 2x = -8y - 9$

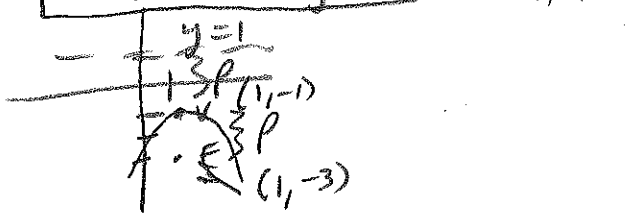
$(x^2 - 2x + \underline{1}) = -8y - 9 + \underline{1}$

$(x-1)^2 = -8y - 8$

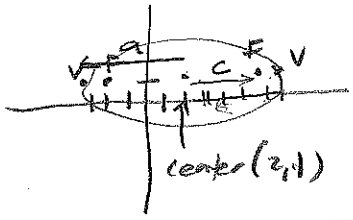
$(x-1)^2 = -8(y+1)$ $\quad -8 = 4p$, $p = -2$

A vertex: $(1, -1)$
focus: $(1, -3)$
directrix: $y = 1$

x^2 type ∪ neg.



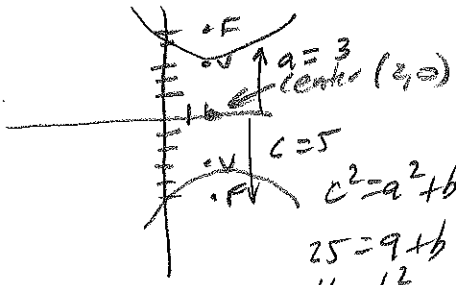
(58) V: $(-3,1)(7,1)$ ellipse
F: $(-2,1)(6,1)$



$c=4$
$a=5$
So $c^2=a^2-b^2$
$16=25-b^2$
$b^2=9$
$b=3$

$$\frac{(x-2)^2}{25}+\frac{(y-1)^2}{9}=1$$ A

(59) V: $(2,3)(2,-3)$ Hyperbola
F $(2,5)(2,-5)$

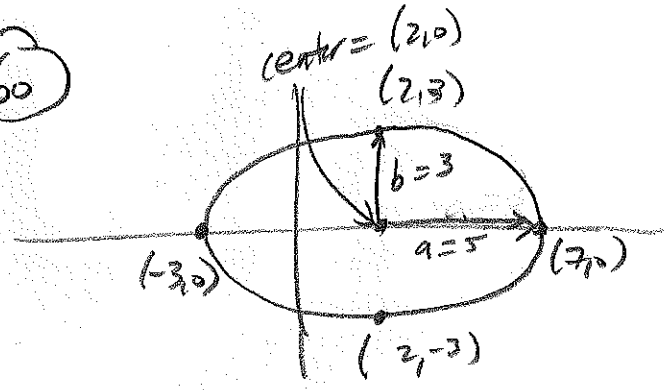


$c^2=a^2+b^2$
$25=9+b^2$
$16=b^2$

$$\frac{(y-0)^2}{9}-\frac{(x-2)^2}{16}=1$$

$$\frac{y^2}{9}-\frac{(x-2)^2}{16}=1$$ B

(60)



$$\frac{(x-2)^2}{25}+\frac{(y+3)^2}{9}=1$$ A

Name_____ Period_____

Honors Algebra 3-4 Fall Semester Multiple Choice Final Review

1. Factor the following completely:

   a. $2x^2-7x-15$

   A $(2x-5)(x+3)$
   B $(2x+3)(x-5)$
   C $(2x+5)(x-3)$
   D $(2x-1)(x-15)$

   b. $25x^2-81y^2$

   A $(5x-9y)^2$
   B $(25x-81y)(x+y)$
   C $(5x-9)(5x+9)$
   D $(5x-9y)(5x+9y)$

2. Solve for x: $10x^2-13x=3$.

   A $\frac{2}{3},-5$
   B $-\frac{3}{2},\frac{1}{5}$
   C $-1,\frac{3}{10}$
   D $\frac{3}{2},-\frac{1}{5}$

3. Solve for x: $2x^2-6x+3=0$.

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

4. Solve for x: $(2x+6)^2=28$.

   A $-3\pm\sqrt{7}$
   B $3\pm\sqrt{7}$
   C $\frac{-6\pm7\sqrt{2}}{2}$
   D $-3\pm2\sqrt{7}$

5. Solve for x: $\sqrt{2x+7}-x=2$.

   A -3
   B 1
   C -3, 1
   D -1, 3

6. Solve for x: $\sqrt{x-16}-1=2$

A -5, 5
B 17
C 17, 25
D 25

7. Solve for x: $\frac{2x}{x-3}-2=\frac{6}{x^2-9}$.

A -12
B -2
C 2
D 6

8. Solve for x: $\frac{1}{x-2}+\frac{3}{x+3}=\frac{4}{x^2+x-6}$.

A $-\frac{3}{4}$
B $\frac{4}{7}$
C $\frac{3}{4}$
D $\frac{7}{4}$

9. Solve for x: $\frac{1}{2}|2x-6|\geq 16$.

A $(-\infty,-13]$
B $(-\infty,-13]\cup[19,\infty)$
C $[-13,19]$
D $[19,\infty)$

10. Solve for x: $\frac{1}{4}|5x+2|<7$.

A $(-\infty,-6)\cup\left(\frac{26}{5},\infty\right)$
B $(-\infty,-6]\cup\left[\frac{26}{5},\infty\right)$
C $\left(-6,\frac{26}{5}\right)$
D $\left[-6,\frac{26}{5}\right]$

11. Simplify the following expressions:

a. $\left(\frac{27}{8}\right)^{-\frac{5}{3}}$

A $-\frac{243}{32}$

B $-\frac{32}{243}$

C $\frac{32}{243}$

D $\frac{243}{32}$

b. $(6x^3y^2)^3(3x)^{-3}$

A $2x^6y^6$

B $8x^3y^6$

C $8x^6y^6$

D $5832x^6y^6$

12. For $g(x)=2x^3-8x^2-2x+5$, find $g(-3)$.

A -115
B -19
C 115
D 125

13. If $f(x)=4-x^2$ and $g(x)=x+2$, find $f(g(x))$.

A $-x^2-4x$
B $-x^3-2x^2+4x+8$
C x^2+4x
D x^3+2x^2-4x-8

14. If $f(x)=x^2+4x+5$ and $g(x)=x-7$, find $3g(f(-2))$.

A -42
B -18
C -6
D 10

15. Given $f(x)=3x^2+7x-2$ and $g(x)=4x+3$, find $(g-f)(x)$.

A $-3x^2-3x+5$
B $3x^2+3x-5$
C $-3x^2+11x+1$
D $3x^2-4x-5$

16. Find the domain of $f(x)=\frac{2x}{\sqrt{x+4}}$.

A $(-4,4)$
B $(-4,\infty)$
C $[-4,\infty)$
D $(4,\infty)$

17. Find all the values of x such that $f(x)=(x+1)(x^2-4)>0$.

A $(-\infty,-2)\cup(-1,2)$
B $(-\infty,-2)\cup(2,\infty)$
C $(-2,-1)\cup(-1,2)$
D $(-2,-1)\cup(2,\infty)$

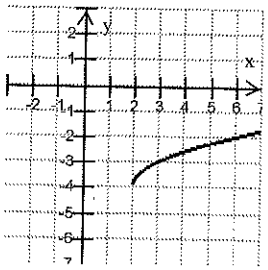
18. Describe the transformation of the graph of $f(x)=x^3$ for the graph of $g(x)=(x+5)^3-9$.

A Horizontal shift 5 units to the right. Vertical shift 9 units down.
B Horizontal shift 9 units to the right. Vertical shift 5 units up.
C Horizontal shift 5 units to the left. Vertical shift 9 units down.
D Horizontal shift 9 units to the left. Vertical shift 5 units up.

19. Describe the transformation of the graph of $f(x)=x^2$ for the graph of $g(x)=-\frac{3}{4}(x-8)^2+10$.

A Vertical Stretch. Reflects over the x-axis. Horizontal shift 8 units to the right. Vertical shift 10 units up.
B Vertical Shrink. Reflects over the x-axis. Horizontal shift 8 units to the left. Vertical shift 10 units up.
C Vertical Shrink. Horizontal shift 8 units to the right. Vertical shift 10 units up.
D Vertical Shrink. Reflects over the x-axis. Horizontal shift 8 units to the right. Vertical shift 10 units up.

20. Write the equation for the given graph:



A $y=\sqrt{x-2}-4$
B $y=\sqrt{x+4}-2$
C $y=\sqrt{x+2}-4$
D $y=\sqrt{x-4}-2$

21. For each of the following functions determine if they are: even, odd, both or neither.
a. $f(x)=4x^2+8x-2$ b. $f(x)=|x|+3$ c. $f(x)=x^3-2x$

A Even
B Odd
C Both
D Neither

22. Find the inverse of: $f(x)=2x-3$.

A $f^{-1}(x)=3x-2$

B $f^{-1}(x)=\frac{1}{2}x+\frac{3}{2}$

C $f^{-1}(x)=x+3$

D $f^{-1}(x)=\frac{x-2}{3}$

23. Find the x-intercept(s): $f(x)=\frac{3x-5}{x+4}$.

A $(-4,0)$

B $(-4,0),\left(\frac{5}{3},0\right)$

C $\left(\frac{5}{3},0\right)$

D $\left(\frac{5}{3},-4\right)$

24. Use long division to divide: $(4x^3-8x^2+5x-2)\div(2x-3)$.

A $2x^2-x+1+\frac{1}{2x-3}$

B $2x^2-7x+13-\frac{41}{2x-3}$

C $2x^2-x+1-\frac{5}{x+1}$

D $4x^2-2x-8-\frac{14}{x+1}$

25. Use synthetic division to divide: $(4x^3-3x+5)\div(x+1)$.

A $4x^3-4x^2+x+4$

B $4x^2-7x+12$

C $4x^2-4x+1+\frac{4}{x+1}$

D $4x^2+4x+1+\frac{6}{x+1}$

26. Find the horizontal or slant asymptote(s): $f(x)=\frac{x^2-x}{x+1}$

A $x=-1$

B $x=0,\ x=1$

C $y=x-2$

D $y=1$

27. Find the horizontal or slant asymptote(s): $f(x)=\frac{2x-1}{x}$

A $x=0$
B $x=\frac{1}{2}$
C $y=2x$
D $y=2$

28. Find the vertical asymptote(s): $f(x)=\frac{x-6}{x^2-4}$.

A $x=\pm 2$
B $x=2$
C $x=6$
D $y=0$

29. Divide, then express your answer in standard form: $\frac{8-7i}{1-2i}$

A $-\frac{6}{5}-\frac{23}{5}i$
B $-\frac{22}{3}-3i$
C $2+\frac{23}{3}i$
D $\frac{22}{5}+\frac{9}{5}i$

30. Multiply, then express your answer in standard form: $(6 - 2i)(2 - 3i)$.

A $6 - 22i$
B $12 - 16i$
C $18 - 16i$
D $18 - 22i$.

31. Find the real zeros of the function: $f(x)=6x^4+11x^3+2x^2-5x-2$.

A $-1,\frac{2}{3}$
B $-1,0,\frac{2}{3}$
C $-1,-\frac{1}{2},\frac{2}{3}$
D $-1,-\frac{2}{3},-\frac{1}{2},\frac{2}{3}$

32. Find all the zeros of the function: $f(x) = x^4 - 4x^3 + 8x^2 - 16x + 16$.

A 2
B $-2, 2$
C $2, \pm 2i$
D $\pm 2, \pm 2i$

33. Find a polynomial function that has a zero at 2, and a multiplicity of 2 for zeros at 0 and –3.

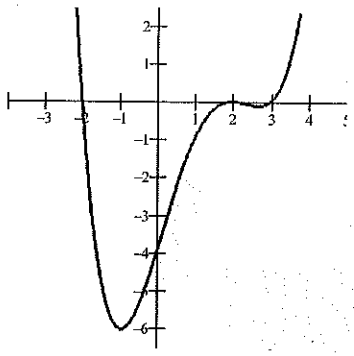
A $f(x) = x^3 + x^2 - 6x$
B $f(x) = x^5 + 4x^4 - 3x^3 - 18x^2$
C $f(x) = x^5 - 10x^4 - 3x^3 - 18x^2$
D $f(x) = x^5 - 4x^4 - 3x^3 + 18x^2$

34. Find a 4th degree polynomial that has the following zeros: -2, 3, $2i$

A $f(x) = x^4 + x^3 - 2x^2 + 4x - 24$
B $f(x) = x^4 + x^3 - 10x^2 - 4x + 24$
C $f(x) = x^4 - x^3 - 2x^2 - 4x - 24$
D $f(x) = x^4 - x^3 - 8x^2 + 12x$

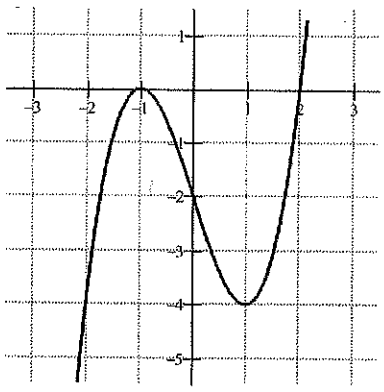
35. Which of the following is the equation for the given graph.

A $y = \frac{-1}{6}(x-2)^2(x+2)(x-3)$
B $y = \frac{1}{6}(x-2)^2(x+2)(x-3)$
C $y = \frac{1}{6}(x+2)^2(x-2)(x+3)$
D $y = \frac{1}{4}(x-2)^2(x+2)(x-3)$



36. The figure shows the graph of $f(x) = (x+1)(x-2)(x-a)$. Determine the value of a.

A -2
B -1
C 1
D 2

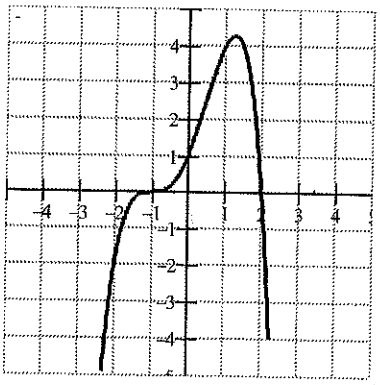


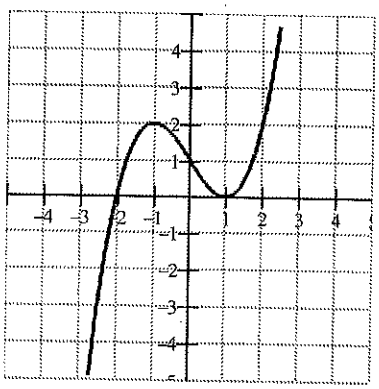
37. Match the following equations with the appropriate graphs:

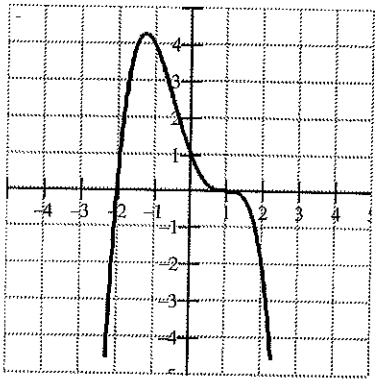
_____ **I.** $y=\frac{-1}{2}(x-1)^3(x+2)$ _____ **II.** $y=\frac{1}{2}(x+1)^3(x-2)$

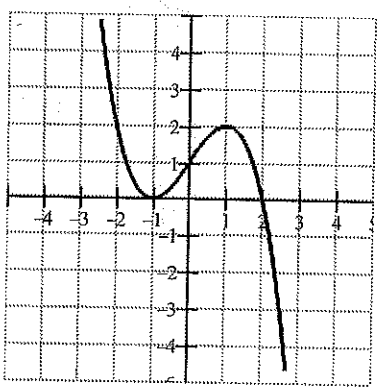
_____ **III.** $y=-\frac{1}{2}(x+1)^3(x-2)$ _____ **IV.** $y=\frac{1}{2}(x+1)^2(x-2)$

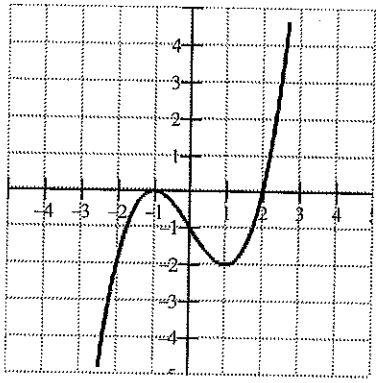
_____ **V.** $y=-\frac{1}{2}(x+1)^2(x-2)$ _____ **VI.** $y=\frac{1}{2}(x-1)^2(x+2)$

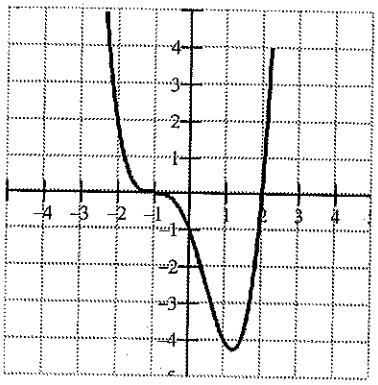
A 

B 

C 

D 

E 

F 

38. Write in exponential form: $\log_a y = x$

A $y^a = x$
B $a^y = x$
C $y^x = a$
D $a^x = y$

39. Evaluate $\log_5 8$ using the change of base formula

A 0.2041
B 0.7740
C 1.0586
D 1.2920

40. Rewrite $4\ln 3 - \frac{1}{2}\ln(9)$ as a single logarithm.

A $\ln 2.7$
B $\ln 3$
C $\ln 27$
D $\ln 243$

41. Rewrite log2 + 3log4 as a single logarithm.

A log 14
B log 20
C log 24
D log 128

42. Write as a sum, difference, or multiple of logarithms: $\log\sqrt[5]{\frac{(x-1)^2}{(x-3)(x+2)^3}}$

A $\sqrt[5]{2\log(x-1)-\log(x-3)+3\log(x+2)}$
B $\frac{1}{5}[2\log(x-1)-\log(x-3)-3\log(x+2)]$
C $\sqrt[5]{\frac{2\log(x-1)+\log(x-3)}{3\log(x+2)}}$
D $\frac{1}{5}\left(\frac{2\log(x-1)}{\log(x-3)+3\log(x+2)}\right)$

43. Write as a sum, difference, or multiple of logarithms: $\log\left(\frac{xy^3}{z^2w}\right)^7$

A $7(\log x+3\log y-2\log z-\log w)$
B $7(\log x+3\log y-2\log z+\log w)$
C $7\left[\frac{\log x \bullet 3\log y}{2\log z \bullet \log w}\right]$
D $\left[\frac{\log x+3\log y}{2\log z+\log w}\right]^7$

44. Solve $8^x = 40$ for x in common log form.

A $\log\frac{8}{40}$
B $\log\frac{40}{8}$
C $\frac{\log 8}{\log 40}$
D $\frac{\log 40}{\log 8}$

45. Solve $5^x = 32$ for x to the nearest hundredth.

A .46
B .81
C 2.15
D 6.40

46. Solve for x: $4^{2x-7} = 1024$

A $\frac{1}{5}$
B 5
C 6
D 131.5

47. Solve for x: $9^{5x} = 243^{3x-2}$

A $\frac{2}{5}$
B $\frac{54}{76}$
C 2
D 27

48. Solve for x: $\log 10^{3x-11} = 40$

A $\frac{11+\log 40}{3}$
B $\frac{40}{3\log 10} - \frac{11}{3}$
C 5
D 17

49. Solve for x: $\ln e^{5x+3} = 22$

A $\frac{19}{5}$
B 5
C $\frac{22}{5\ln e} + \frac{3}{5}$
D $\frac{-3+\ln 22}{5}$

50. Solve for x: $\log(1-2x)-\log(x-1)=1$

A $\frac{1}{3}$

B $\frac{2}{3}$

C $\frac{11}{12}$

D no solution

51. Solve for x: $\log_4 x+\log_4(x+2)=\log_4(3x+56)$

A -54
B -7
C -7, 8
D 8

52. You win $10,000 in the state lottery and deposit the earnings in a bank account. The money is invested at a rate 6.2% compounded continuously. How many years will it take to double your money?

A .11 years
B 1.12 years
C 4.86 years
D 11.18 years

53. Find the initial amount invested at $7\frac{1}{4}\%$ interest compounded quarterly if, after 6 years, it has grown to $20,000.

A $12,945.29
B $12,995.82
C $13,141.54
D $30,779.14

54. Determine the annual rate of interest compounded continuously for the sum of money in an account to quadruple in 25 years.

A 2.4%
B 5.5%
C 5.7%
D 16%

55. Match the following conics:

_____	I.	$5x^2=3y-4$	**A**	Hyperbola
_____	II.	$7x^2-5x+6y^2+7y=9$	**B**	Parabola
_____	III.	$7x^2-5x+7y^2+6y=9$	**C**	Ellipse
_____	IV.	$7x^2-5x-7y^2+6y=9$	**D**	Circle

56. Rewrite the equation of the circle in standard form: $2x^2+2y^2-8x+12y+2=0$

A $(x-2)^2+(y+3)^2=12$
B $(x+2)^2+(y-3)^2=12$
C $(x-2)^2+(y+3)^2=15$
D $(x-4)^2+(y+6)^2=25$

57. Find the vertex, focus, and directrix of the following parabola: $x^2-2x+8y=-9$

A vertex: (1,-1); focus: (1,-3); directrix: $y=1$
B vertex: (1,-3); focus: (1,-1); directrix: $y=1$
C vertex: (1,-1); focus: (1,-3); directrix: $x=1$
D vertex: (1,-1); focus: (1,-3); directrix: $y=-1$

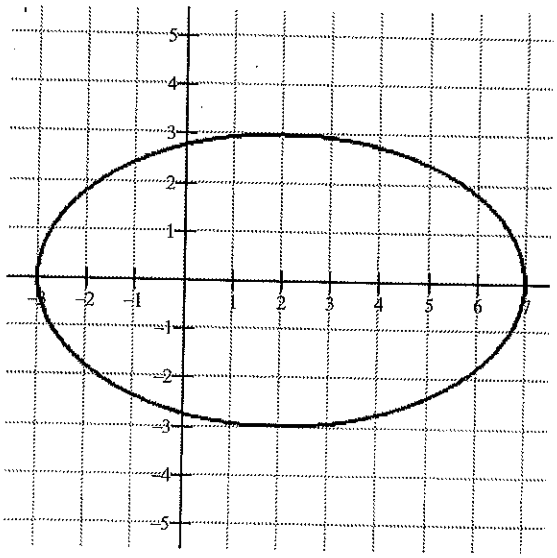
58. Find the equation of the ellipse with vertices (-3,1) and (7,1), and foci (-2,1) and (6,1).

A $\frac{(x-2)^2}{25}+\frac{(y-1)^2}{9}=1$
B $\frac{(x+2)^2}{25}+\frac{(y+1)^2}{9}=1$
C $\frac{(x-2)^2}{25}-\frac{(y-1)^2}{9}=1$
D $\frac{(x-2)^2}{5}+\frac{(y-1)^2}{3}=1$

59. Find the equation of the hyperbola with vertices (2,3) and (2,-3), and foci (2,5) and (2,-5).

A $\frac{y^2}{9}+\frac{(x-2)^2}{16}=1$
B $\frac{y^2}{9}-\frac{(x-2)^2}{16}=1$
C $\frac{(x-2)^2}{16}-\frac{y^2}{9}=1$
D $\frac{y^2}{9}-\frac{(x+2)^2}{16}=1$

60. Which equation represents the graph for the given ellipse?



A $\frac{(x-2)^2}{25}+\frac{y^2}{9}=1$

B $\frac{(x-2)^2}{25}-\frac{y^2}{9}=1$

C $\frac{(x-2)^2}{5}+\frac{y^2}{3}=1$

D $\frac{(x-2)^2}{5}-\frac{y^2}{3}=1$

Honors Algebra 3-4 Fall Semester
Multiple Choice Answer Key

(17A's; 17 B's; 17 C's; 19 D's; 1 E; 1 F)

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