

**Precalculus/Honors Algebra 3-4 Fall Semester Open-Ended Final Review**

1. For  $h(x) = 3x^4 - 2x^3 + x^2 - 2$ , find      a.  $h(3)$                       b.  $h(-2)$

2. If  $f(x) = \frac{1}{4}(x-1)$  and  $g(x) = 4x+1$ , find  $f(g(x))$

3. If  $f(x) = 3x^2 - 2x + 1$  and  $g(x) = x - 4$ , find  $f(g(-4))$

4. Given  $f(x) = 2x + 5$  and  $g(x) = x^2 - 3x + 1$ , find each of the following:

a.  $(f + g)(x)$

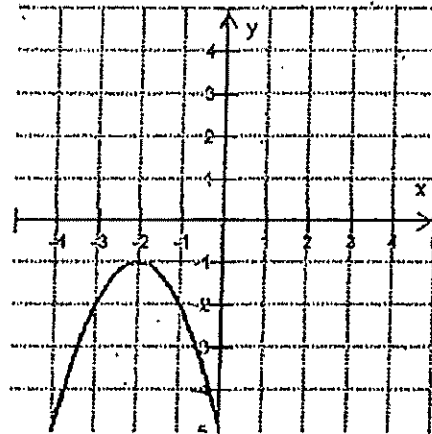
b.  $(g - f)(x)$

5. Find the domain of the following:      a.  $\frac{2x+5}{x^2-9}$                       b.  $\sqrt{7x-35}$                       c.  $\frac{2}{\sqrt{7-x}}$

6. Describe the transformation of the graph of  $f(x) = \sqrt{x}$  for the graph of  $g(x) = -4\sqrt{x+2} - 5$

7. Describe the transformation of the graph of  $f(x) = |x|$  for the graph of  $g(x) = -\frac{1}{8}|x-3| + 7$

8. Write the equation for the given graph:



9. Graph the following:  $f(x) = (x+1)^3 - 4$

10. Is the following function even, odd, or neither?

a.  $f(x) = 16x^5 - 8x^3 + 4x + 2$

b.  $f(x) = x^5 - 7x^3 - 23x$

c.  $f(x) = 6x^4 - 3x^2 + 1$

11. Find the inverse of:  $g(x) = \frac{2x+3}{6}$

12. Find the inverse of:  $f(x) = 8x^3 - 1$

13. Find the x-intercept(s):  $f(x) = \frac{6x^2 - 13x + 5}{x^2 - 9}$

14. Use synthetic division to divide (write answer as a polynomial with a fractional remainder)

$$(5x^4 + x^3 - 3x^2 + 5) \div (x - 1)$$

15. Find the horizontal or slant asymptote(s):

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

16. Find the horizontal or slant asymptote(s):

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

17. Find the vertical asymptote(s) of the following:

a.  $f(x) = \frac{4}{\sqrt{x^2 - 9}}$

b.  $g(x) = \frac{x + 4}{3x - 5}$

18. Simplify the following and express your answers in standard form:

a.  $(4 + 3i) + (8 - 12i)$

b.  $(4 + 3i) - (8 - 12i)$

19. Simplify the following and express your answers in standard form:

a.  $(2 + 3i)(4 - 2i)$

b.  $\frac{2 + 3i}{4 - 2i}$

20. Find the real zeros of the function:  $f(x) = 2x^3 - 3x^2 - 30x + 56$

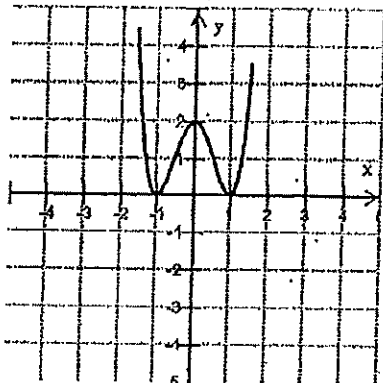
21. Find all the zeros of the function:  $f(x) = x^4 - 2x^3 + 6x^2 - 18x - 27$

22. Find a polynomial function that has the zeros 0, -3, and 2.

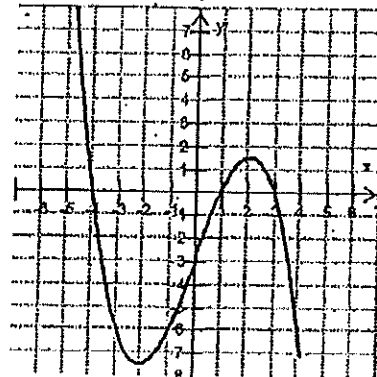
23. Find a 4<sup>th</sup> degree polynomial function that the following zeros: 1, -1, 4i

24. Write the equations for the following:

a. 4<sup>th</sup> Degree Polynomial



b. 3<sup>rd</sup> Degree Polynomial



25. Sketch the graph of:  $f(x) = x^5(x+2)^3(x-1)^2$

26. Find the zeros and use them to sketch the graph of:  $f(x) = x^3 - 4x^2 - 4x + 16$

27. a. Write  $a^x = b$  in logarithmic form.    b. Write  $\log_c t = a$  in exponential form.

28. Use the change of base formula to evaluate the following  
(to the nearest hundredth, when appropriate)

a.  $\log_6 11$

b.  $\log_8 3$

a.  $\log_a x$

29. Rewrite  $2 \log 4 + \log 3 - \log 2$  as a single logarithm

30. Write the expression as the logarithm of a single quantity:

$$\frac{1}{4} [2 \log(x+3) - 4 \log x - \log(x^2 - 1)]$$

31. Write the expression as the logarithm of a single quantity:

$$\log c + \log a + \log b + \log i + \log n$$

32. Write as a sum, difference, or multiple of logarithms:  $\log \left( \frac{x(x+2)^2}{(x-4)^3(x-5)} \right)^4$

33. Solve  $8^x = 9876$  for  $x$  in common log form (do not use a calculator).

34. Solve  $7^x = 139$  for  $x$  to the nearest hundredth.



35. Solve for  $x$ :  $5^{5x-3} = 625$

36. Solve for  $x$ :  $8^{3x} = 32^{x+1}$

37. Solve for  $x$ :  $\log_{10} 5^{x+2} = 87$

38. Solve for  $x$ :  $\ln e^{4x-7} = 21$

Solve for  $x$ :

39.  $\log_3(x^2 - 9) - \log_3(x + 3) = 1$

40.  $\log(x + 60) = \log(x + 5) + \log x$

41. Suppose you invest \$15,000 at 3.8% interest compounded continuously. How many years will it take to triple your money?

42. Find the initial amount invested at 6% interest compounded daily if, after 8 years, it has grown to \$15,000.

43. Determine the annual rate of interest compounded continuously for the sum of money in an account to triple in 18 years.

44. Identify the conic:

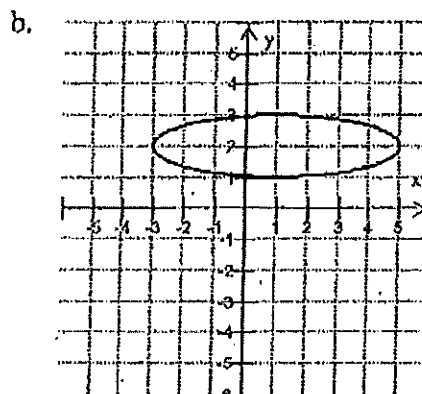
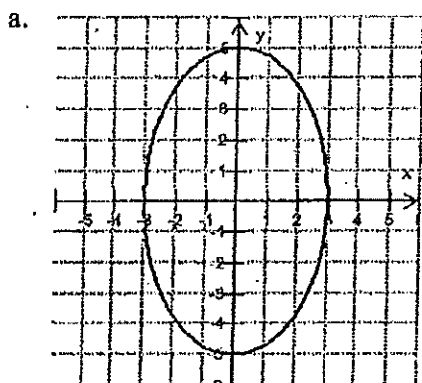
a.  $25(x-3)^2 + 25(y+4)^2 = 100$

b.  $4(x-3)^2 + 25(y+4)^2 = 100$

c.  $4(x-3)^2 - 25(y+4)^2 = 100$

d.  $4(x-3)^2 + 25(y+4)^2 = 100$

45. Write the equations that represent the graphs for the given ellipses:



46. Rewrite the equation of the parabola in standard form, then find the vertex, focus, and directrix:

$$x^2 - 4x + 8y + 12 = 0$$

47. Rewrite the equation of the ellipse in standard form, then find the center, vertices, and foci:

$$9x^2 + 4y^2 - 54x + 40y + 37 = 0$$

48. Rewrite the equation of the hyperbola in standard form, then find the center, vertices, and foci:

$$9x^2 - y^2 - 36x - 6y + 18 = 0$$

49. Find the equation of the hyperbola with vertices  $(-2, -2)$  and  $(4, -2)$ , and foci  $(-4, -2)$  and  $(6, -2)$ .

50. Write an explicit formula for the arithmetic sequence: 2, 5, 8, 11, 14,...

51. Write an explicit formula for the arithmetic sequence with a first term of 100 and a common difference of  $-8$

52. Find the 83<sup>rd</sup> term of the arithmetic sequence with  $a_1 = 1.8$  and  $d = 2.4$   
(assume that  $n$  begins with 1).

53. Find the **sum** of the first 21 terms of the arithmetic sequence whose  $n$ th term is  $a_n = 2n + 5$   
(assume that  $n$  begins with 1).

54. Find the sum:    a.  $\sum_{n=0}^{50} (1000 - 5n)$                       b.  $\sum_{n=2}^5 \frac{4}{n+2}$  (express answer as a fraction)

55. Evaluate:      a.  $\sum_{n=1}^{\infty} 4\left(\frac{7}{3}\right)^{n-1}$                       b.  $\sum_{n=0}^{\infty} 2\left(\frac{-2}{3}\right)^n$

56. Find the coefficient of:

a.  $x^2y^3$  in the expansion of  $(2x-3y)^5$                       b.  $x^8y^4$  in the expansion of  $(x+5y)^{12}$

57. A card is drawn at random from a standard deck of 52 playing cards. Find the probability that the card is:                      a. red                                      b. a king

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

59. A password is comprised of 5 letters followed by 2 digits. To avoid confusion, between “O” and “zero” and “I” and “one”, the letters “O”, and “I” are not used. How many passwords are possible?

60. A bag contains 10 quarters, 7 dimes, and 5 nickels. If three coins are selected without replacement, what is the probability of selecting three quarters?

61. A bag contains 10 quarters, 7 dimes, and 5 nickels. If three coins are selected without replacement, what is the probability of selecting one of each coin?

62. An employer interviews 12 people for four opportunities in the company. Five of the 12 people are women. If all 12 are qualified, in how many ways can the employer fill the four positions if:

a. the selection is random?

b. exactly two women are selected?