Algebra 2
Semester 2 Review

Final exam will count for 20% of your semester grade!

Review Problems

1. List all of the possible rational zeros of $f(x) = 2x^5 - 4x^3 + 5x^2 - 19x + 9$

2. Factor $f(x) = x^3 - 12x^2 + 36x - 32$ completely, given that $(x-2)$ is a factor.

3. Find all real and imaginary zeros of $f(x) = 2x^3 - 5x^2 + 7x - 4$. (Be sure to note whether any of them are double or triple zeros.)

4. Find all real and imaginary zeros of $g(x) = x^4 - 2x^3 - 6x^2 + 14x - 7$. (Be sure to note whether any of them are double or triple zeros.)

5. Write an equation of a polynomial (in standard form) of the least degree that has a leading coefficient of 1, and zeros at –1, 2, and 6.

6. Write a polynomial function in standard form of least degree that has rational coefficients, a leading coefficient of 1, and zeros at 4, -3, and $3\sqrt{2}$.

7. Write a polynomial function in standard form of least degree that has rational coefficients, a leading coefficient of 1, and zeros at $3, 3-i$? (You must show enough work to back up your answer choice).

8. How many zeros does $g(x)=x^4-x^2-12$ have? What is the maximum number of turning points it can have?

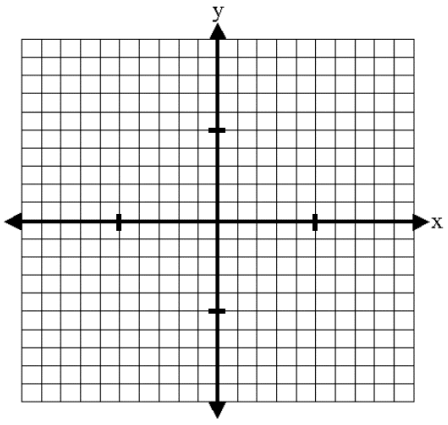
9. From 1890 to 2000, the American Indian population P (in thousands) can be modeled by the function, $f(x)=-.015x^3+.6x^2-2.4x+19$, where t is the number of years since 1890.

a) In what year did the population reach 722, 000?

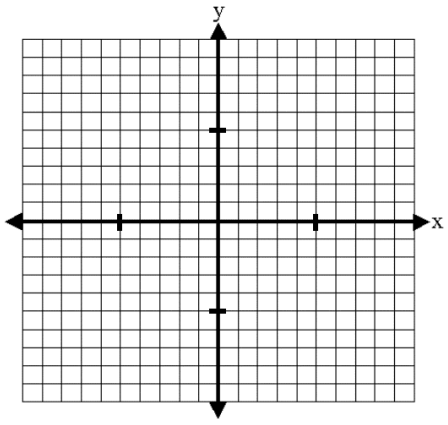
b) What was the population of the American Indians in 1990?

Find all real zeros and graph each polynomial function. **Graph without using calculator.**

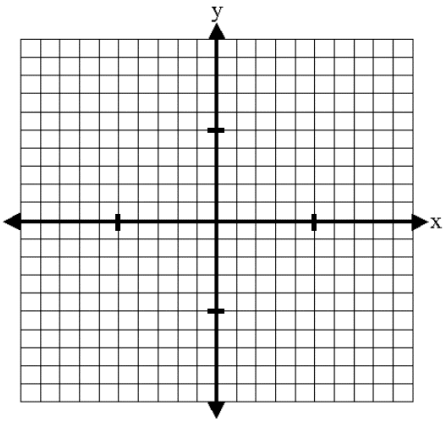
a) $y = x^2(x-1)(x+1)^2$



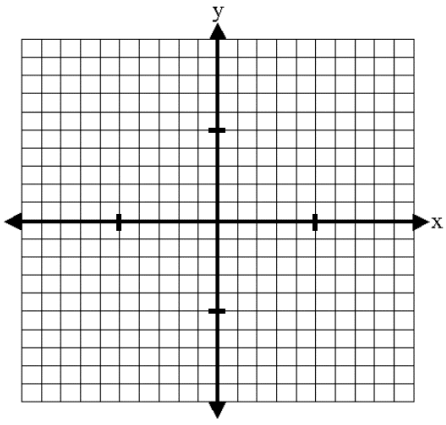
b) $f(x) = x^3 - 3x - 2$



c) $y = x^4 - 6x^2 + 8$



d) $f(x) = x^3 - 4x^2 - 3x + 12$



Simplify completely. There should be no negative exponents or decimals!

10. $-2x^3\left(-3x^2\right)^3$	11. $\frac{3xy^{-1}}{2xy} \div \frac{4x^{-1}}{3y^5}$	12. $\frac{4^{\frac{5}{2}}}{4^2}$
13. $\frac{\left(2r^{-1}s^2t^0\right)^{-2}}{2rs}$	14. $4\sqrt[3]{2x^5} - x\sqrt[3]{16x^2}$	15. $\left(\frac{8}{27}\right)^{\frac{1}{3}} \bullet \left(\frac{8}{27}\right)^{\frac{-2}{3}}$
16. $\sqrt[5]{\frac{x^{10}}{y^{12}}}$	17. $\log_6 36$	18. $\log 0.0001$
19. $\ln e^4$	20. $\log_4 1$	21. $\log_2(16)$
22. $\log\left(\sqrt[3]{10}\right)$	23. $\log_2(-8)$	24. $3\ln(y) - 2\ln(x)$
25. $\frac{1}{2}\log_5 144$	26. $\log_7 10 - 4\log_7 5$	27. $\log_2 8 + \log_2 \frac{1}{2} - \log_2 1$

28. $\dfrac{2x^2+4x}{x^2-4} \div \dfrac{x^2-3x+2}{3x-6}$

29. $\dfrac{5x^2y}{4y^3} \bullet \dfrac{12x^2y^2}{30x^3}$

30. $\dfrac{5x+4}{x^2-64} + \dfrac{3}{x-8}$

31. $\dfrac{x+4}{x^2+2x+1} + \dfrac{x}{x^2-1} - \dfrac{2}{x-1}$

32. $\dfrac{\dfrac{2}{x} + \dfrac{3}{x-1}}{\dfrac{1}{2x-2} - \dfrac{1}{2}}$

33. $\dfrac{x^2+4x+3}{x^2+5x+6} \bullet \dfrac{x^2-3x-10}{x^2+x}$

Solve each equation completely. Leave exact, simplified answers when possible and check for extraneous solutions!

34. $2(x-3)^4 = 32$

35. $\dfrac{1}{4}(x)^3 = 2$

36. $(x+7)^2 = 24$

37. $60 - \dfrac{1}{20}(x+75)^{\frac{3}{2}} = 10$

38. $x+1 = \sqrt{19-x}$

39. $\sqrt{2x+3} - \sqrt{x+1} = 1$

40. $x^3 = 64$

41. $2x^6 = 1458$

42. $\sqrt[5]{4x-8} = 2$

43. $10^{2x} = 57$

44. $e^{\frac{4x}{3}} = 18$

45. $3(0.8)^{2a} - 5 = 19$

46. $\log(3x+2) + \log(x-1) = 1$

47. $\log_2(2x) = 1 - \log_2(x)$

48. $\log_9(4x+1) - \log_9(2x-7) = \frac{1}{2}$

49. $\log_5(a+3) - \log_5(a-1) = 1$

50. $\log_2 x = -4$

51. $6\ln\frac{3x}{2} = 5$

52. $\log_3(1-8x)=2$

53. $7\ln 4x=2$

54. $5\bullet 3^x=4\bullet 2^x$

55. $\dfrac{2}{x-2}=\dfrac{4}{x+2}$

56. $\dfrac{-x+1}{x-1}+2=\dfrac{1}{x}$

57. $\dfrac{x}{2x-1}-\dfrac{2}{2x+1}=\dfrac{x^2+20}{4x^2-1}$

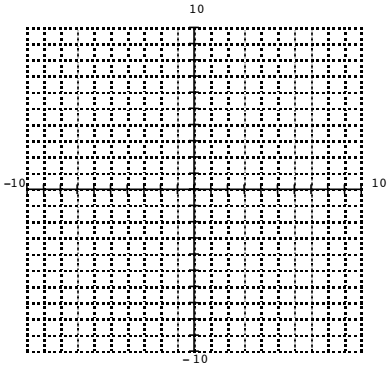
58. $\dfrac{5}{x-1}+\dfrac{x+2}{x^2-5x+4}=3$

59. $\dfrac{7}{x-1}-5=\dfrac{6}{x^2-1}$

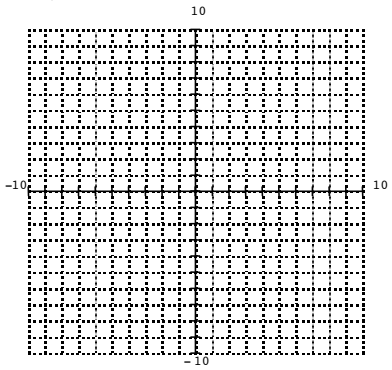
60. $\dfrac{3}{x-7}+\dfrac{9}{x^2-5x-14}=\dfrac{x+1}{x+2}$

Graph the following equations accurately. You must use enough points!

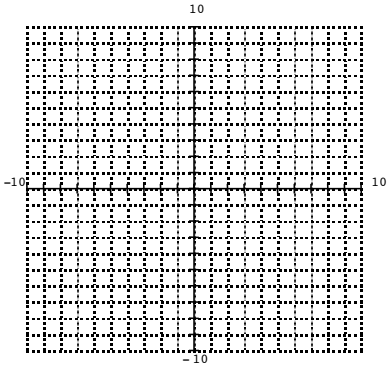
61. $y = \frac{1}{2}\sqrt[3]{x-3}+1$



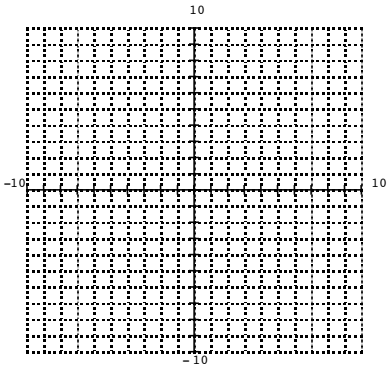
62. $y = -2\sqrt{x+4}-1$



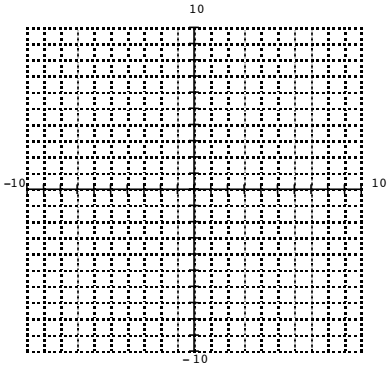
63. $f(x) = \log_2(x)-4$



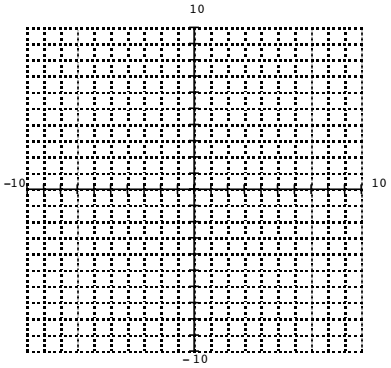
64. $f(x) = \frac{1}{2}\bullet 4^{x+2}-1$



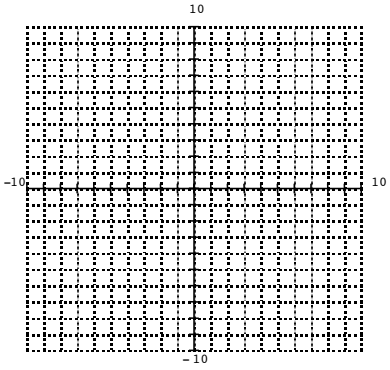
65. $f(x) = \log_3(x+6)$



66. $f(x) = -2e^x + 5$ (in calc)



67. $f(x) = \ln(x+2)-2$ (in calc)



Given the functions below, answer the questions that follow.

$f(x)=2x-4$ $g(x)=3x^{-1}$ $h(x)=-3x^{2}$ $j(x)=6x^{-3}$ $l(x)=4x^{\frac{1}{2}}$

68. $f(g(2))$ 69. $h(f(x))$ 70. $\frac{g(x)}{l(x)}$ 71. $h(h(x))$

72. Domain of $l(x)$ 73. Range of j(x)

74. Verify that f and g are inverse functions using composition: $f(x)=2x^{7}$ and $g(x)=\sqrt[7]{\frac{x}{2}}$

75. Find the inverse of each function.

a) $f(x)=\frac{3}{2}x^{3}+4$ b) $f(x)=3x^{8}, x\geq 0$ c) $f(x)=\frac{4-5x}{2}$

d) $g(x)=3^{x}$ e) $h(x)=\frac{1}{2}\cdot 5^{x+1}$ f) $g(x)=-3x+4$

76. The projected worth (in millions of dollars) of a large company is modeled by the equation $y=256(1.04)^{x}$. The variable x represents the number of years since 1997.

What is the annual percent of growth?

When will the company be worth 300 million dollars?

77. Write an exponential function to model the situation then estimate the value of the function after 5 years?

A population of 490 animals decrease at an annual rate of 7%

78. How much money must be deposited now in an account paying 8% annual interest, compounded quarterly, to have a balance of $1000 after 10 years?

79. Marion decided to invest $6000 at 5% interest compounded continuously. Find the value of his investment after 7 years.

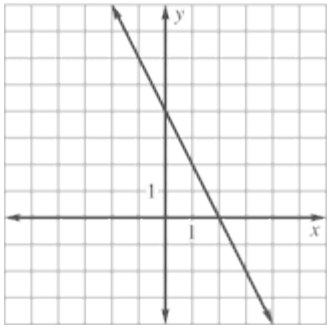
80. There are initially 2000 bacteria in a culture. The number of bacteria, *N*, after *t* hours can be found using the formula $N = 2000(2)^t$.

What is the hourly percent of growth?

How long will it take the culture to grow to 60,000 bacteria?

81. **Write an equation for each graph.**

a)



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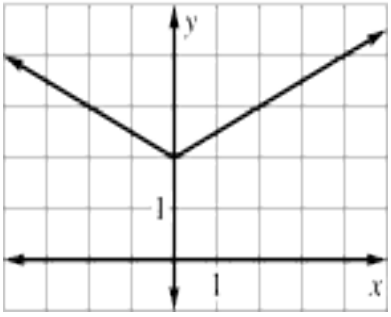

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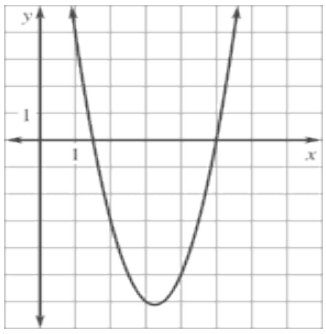
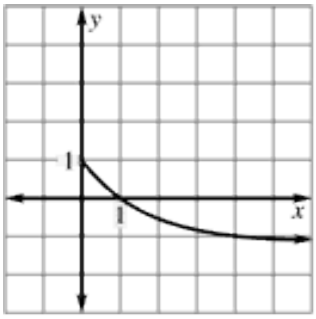


d)



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