

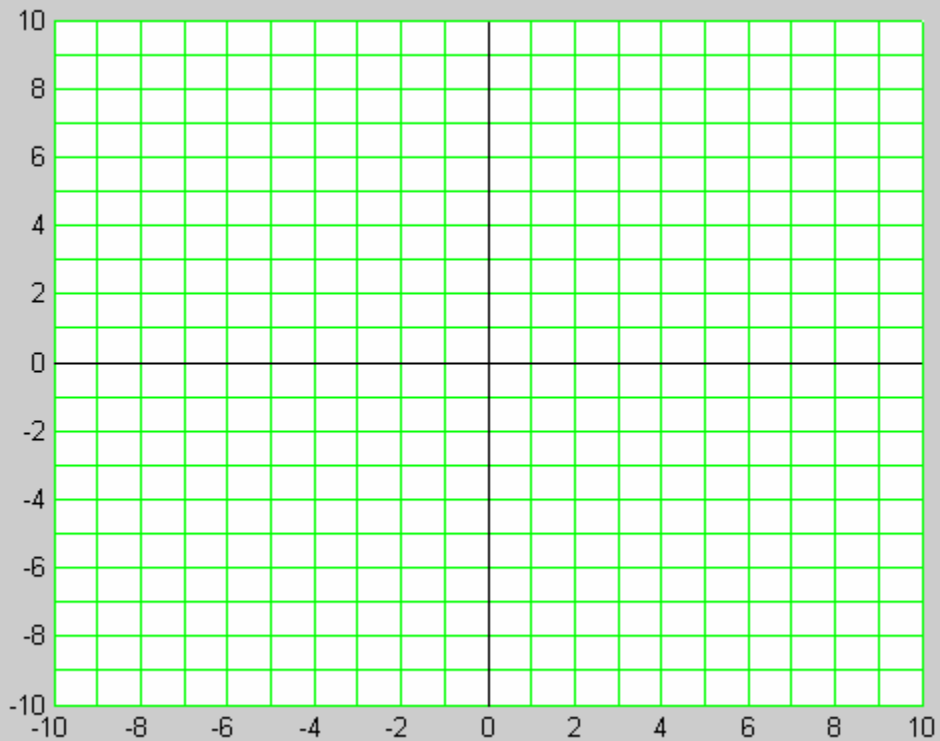
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**Math 100 Sections E/F – Spring 2007
Final Examination**

1. Solve $2x - 1 = 6 + x$.

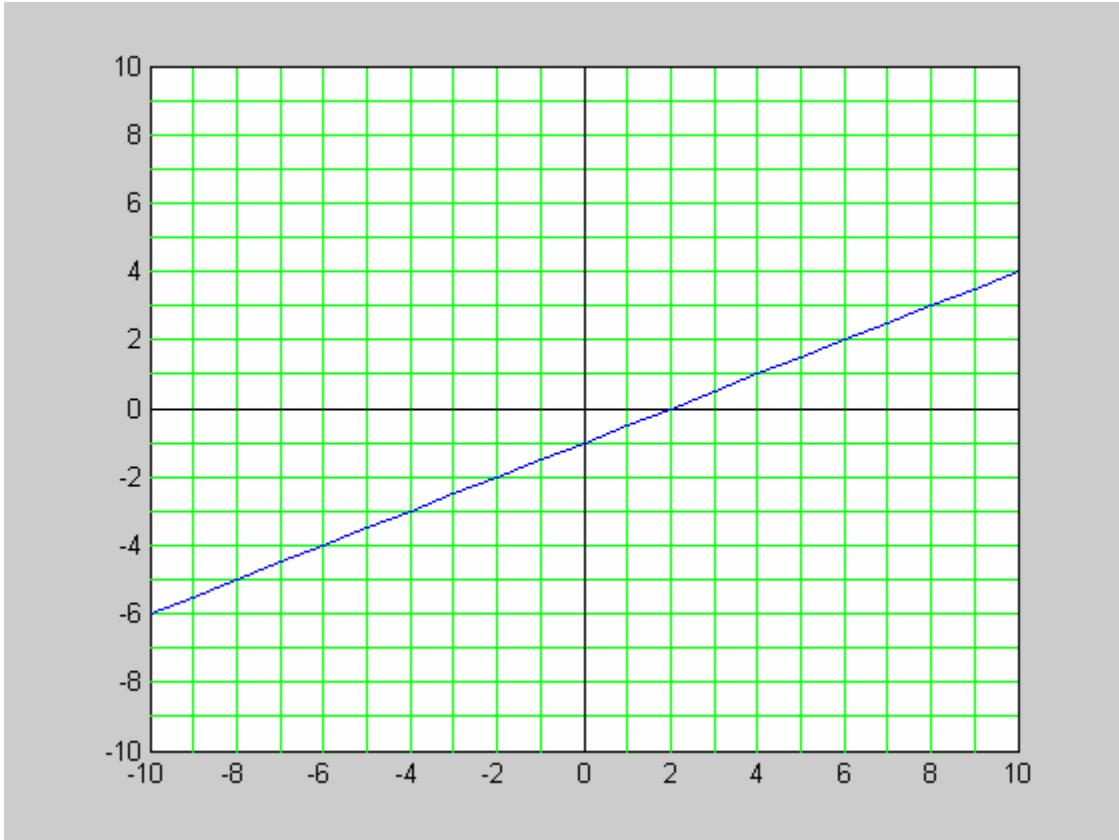
2. Given that $x = 2$ is the solution to $ax^2 + 1 = ax - 2$, what is a ?

3. Graph the line $y = 3x + 1$ on the axes below.



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4. What is the equation of the line graphed below?



5. Solve (simplify) the inequality $7 + x > 3x + 5$.

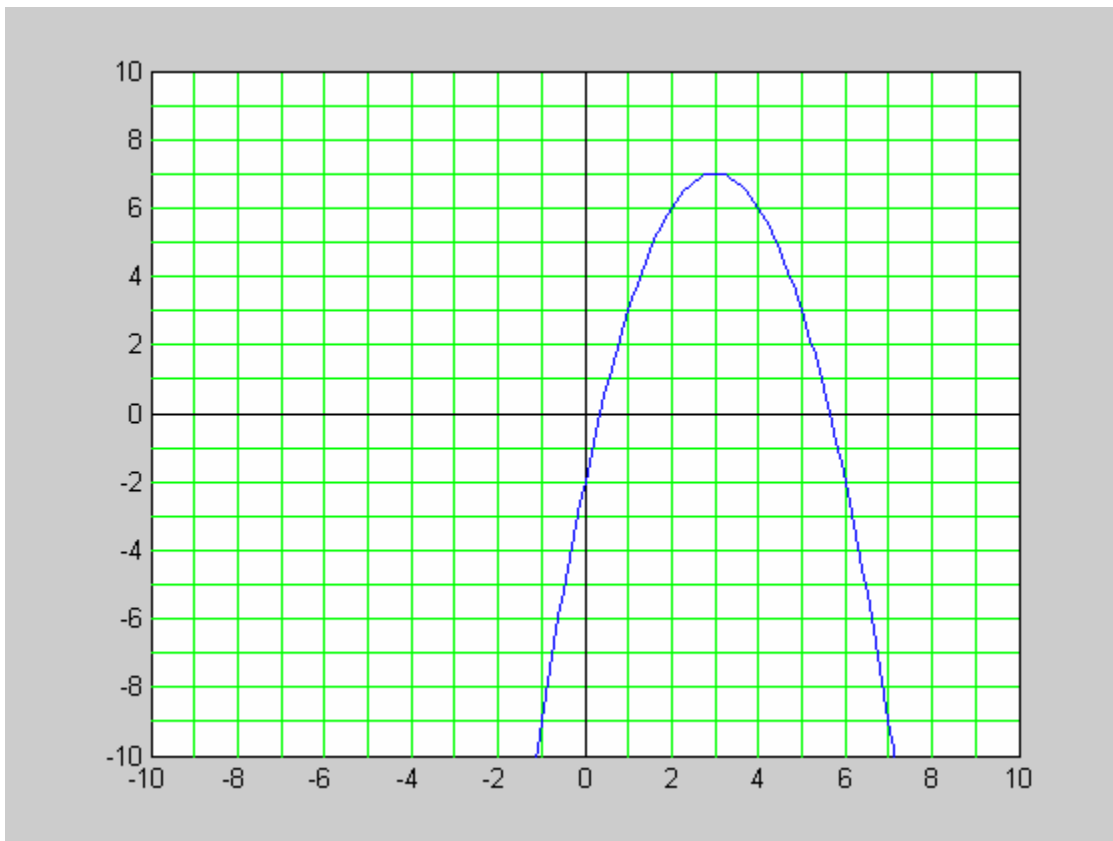
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6. According to the U.S. Census Bureau, “The median value of single-family homes in the United States rose from \$30,600 in 1940 to \$119,600 in 2000, after adjusting for inflation.” Assuming the growth in median home value is linear (which actually is a decent model over the last 60 years for the national numbers – local numbers show significantly more variation), what will the median value of a single-family home be in 2015 (in constant dollars)?

7. Solve $x^2 + 6x - 27 = 0$.

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8. What is the equation of the parabola that has vertex at $(3,7)$ and passes through the point $(0,-2)$?



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9. Let $f(x) = x^2 + 6x - 5$ and $g(x) = 2x - 3$. Compute each of the following. You must simplify your answer for full credit.

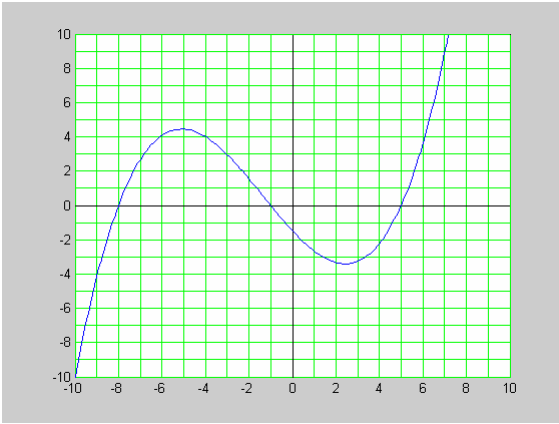
a. $f(g(x))$

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

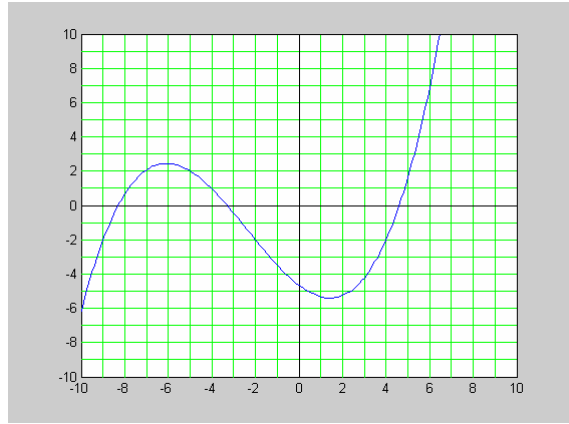
10. A certain product has supply and demand functions given by $p = 7q + 10$ and $p = 120 - 3q$ respectively, where p is price and q is quantity. At what price will supply equal demand?

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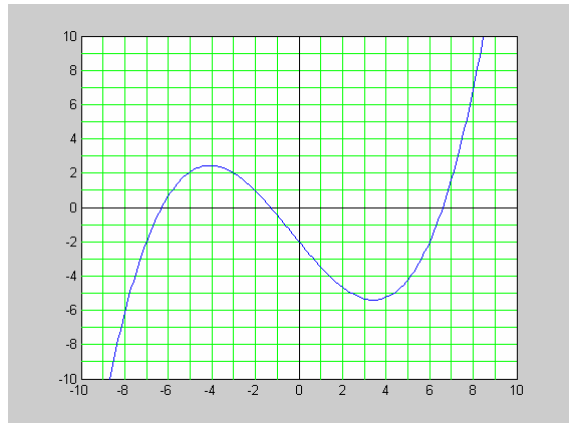
11. The graph of $y = f(x)$ is shown below on the left. Note that the graph passes through the lattice points $(-8, 0)$, $(-4, 4)$, $(-1, 0)$, and $(5, 0)$. Which graph on the right is the graph of $y = f(x+1) - 2$?



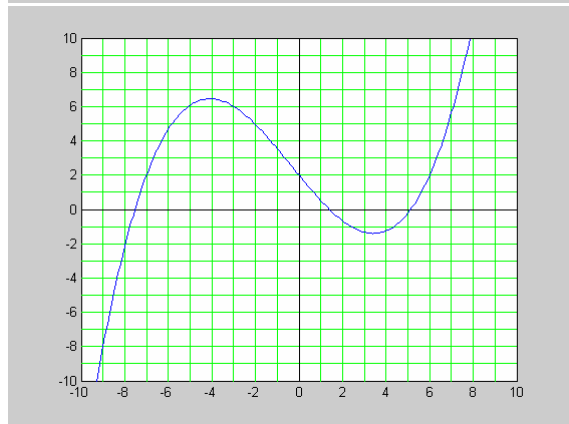
(a)



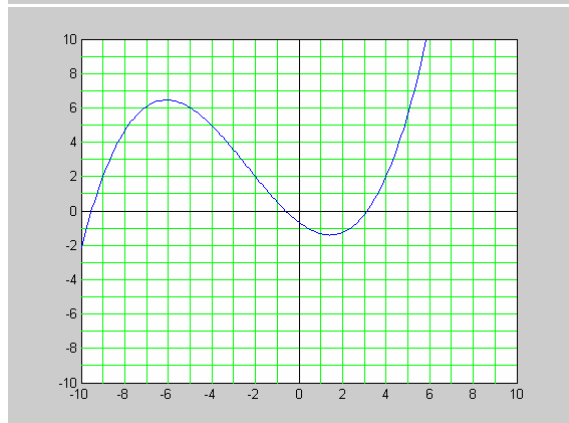
(b)



(c)



(d)



Name: _____

12. The height of a ball (in meters) thrown upward with initial velocity 20m/sec is $h(t) = 20t - 5t^2$. What is the maximum height the ball reaches? Remember you must show your work for full credit.

13. Solve the equation $|4x + 1| = 6x - 3$.

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14. Solve (simplify) the inequality $x^2 + 2x - 2 > 3x + 10$.

15. Suppose $f(x) = -4 + \sqrt{2x}$. What is $f^{-1}(x)$?

Name: _____

16. Simplify the equation $y = 100 \times 1.07^x$ by taking the logarithm of each side.

17. Suppose $\log(a) = 0.8$ and $\log(b) = -1.2$, what is $\log(ab^3)$?

18. Solve the equation $2e^{2x} + 1 = 5$.

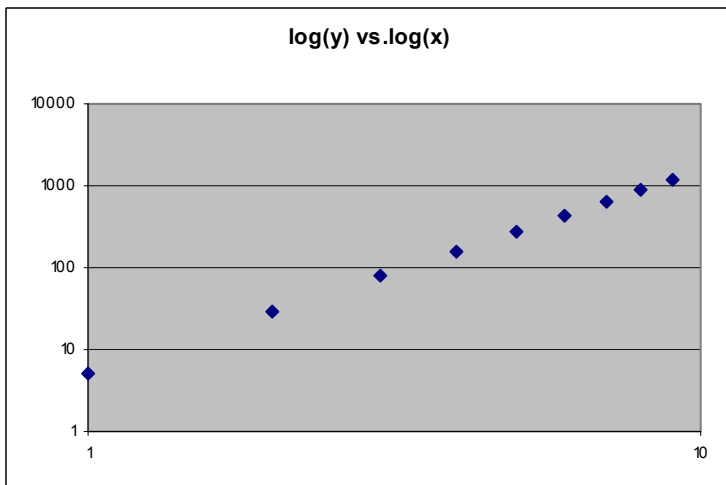
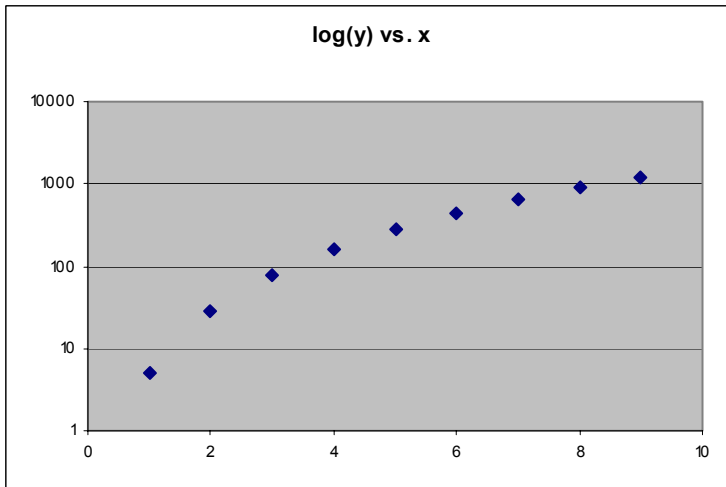
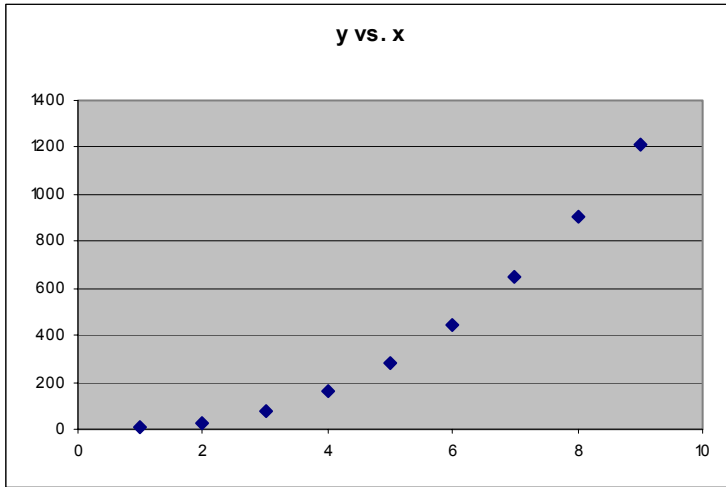
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19. Suppose you invest \$15,000 in the bank with a interest rate of 6% compounded semi-annually (that is, twice a year). How much will you have after 5 years?

20. Find all the solutions (real and complex) to $x^3 + 4x^2 - 2x - 20 = 0$. Hint: one solution is $x = 2$.

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21. The graphs of y vs. x in standard scale, semi-log scale, and log scale are shown below (each graph shows the same data, but with different scales). Would a power model or an exponential model be the best fit for this data?

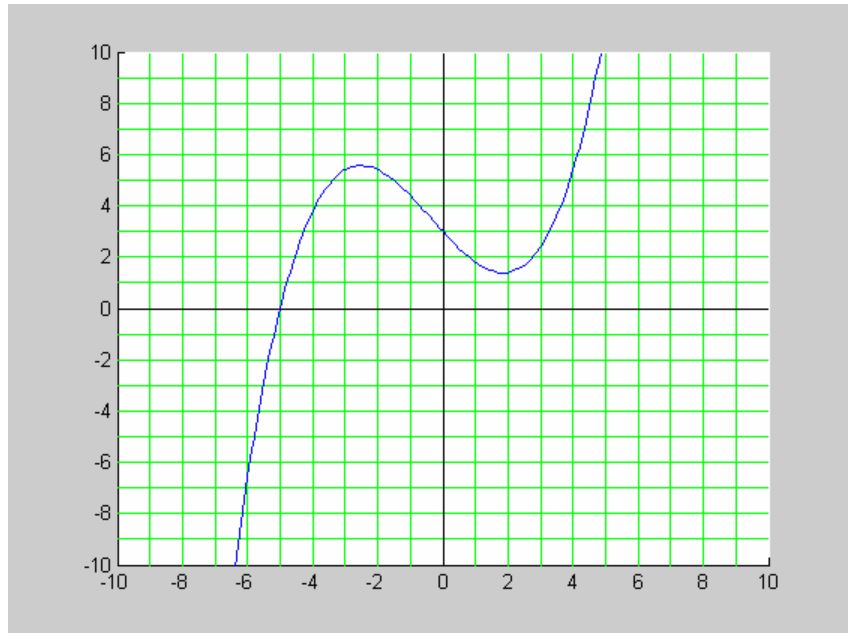


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22. Find a polynomial with single roots at $x = 1$ and $x = -2$ and a double root at $x = 2$. For full credit you must write the polynomial in standard form (i.e. $a_n x^n + \dots + a_1 x + a_0$).

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23. Answer the following questions about the polynomial graphed at the right. You may assume nothing interesting happens outside the window shown.



- a. How many real roots does the polynomial have?

- b. How many turning points does the polynomial have?

- c. Is the leading coefficient positive or negative?

- d. Is the constant term positive or negative?

- e. What is the least possible degree for the polynomial?

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24. Solve the equation $\frac{2x+12}{2x-21} = \frac{x-3}{x-6}$.

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$$2x + 8y + 2z = 2$$

25. Solve the system of equations: $3x + 13y + 3z = 1$. You must show how you checked

$$-4x - 20y - 5z = 3$$

your work to receive full credit. Hint: $\begin{pmatrix} 2 & 8 & 2 \\ 3 & 13 & 3 \\ -4 & -20 & -5 \end{pmatrix}^{-1} = \begin{pmatrix} 2.5 & 0 & 1 \\ -1.5 & 1 & 0 \\ 4 & -4 & -1 \end{pmatrix}$.

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26. Suppose $A = \begin{pmatrix} 1 & 3 & 5 \\ 2 & -2 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 \\ -1 & 7 \\ a & -3 \end{pmatrix}$. Compute each of the following, or

state that they are not defined.

a. $A + B$

b. AB

c. BA

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27. A glass of skim milk supplies 0.1mg of iron and 8.5g of protein. A quarter pound of lean meat provides 3.4 mg of iron and 22g of protein. If a person on a special diet is to have 7.1mg of iron and 69.5g of protein, how many glasses of skim milk and how many quarter-pound servings of meat will provide this?

Name: _____

Pledge:

On my honor, as a student, I have neither given nor received unauthorized aid on this

examination: _____

(signature)

(date)