

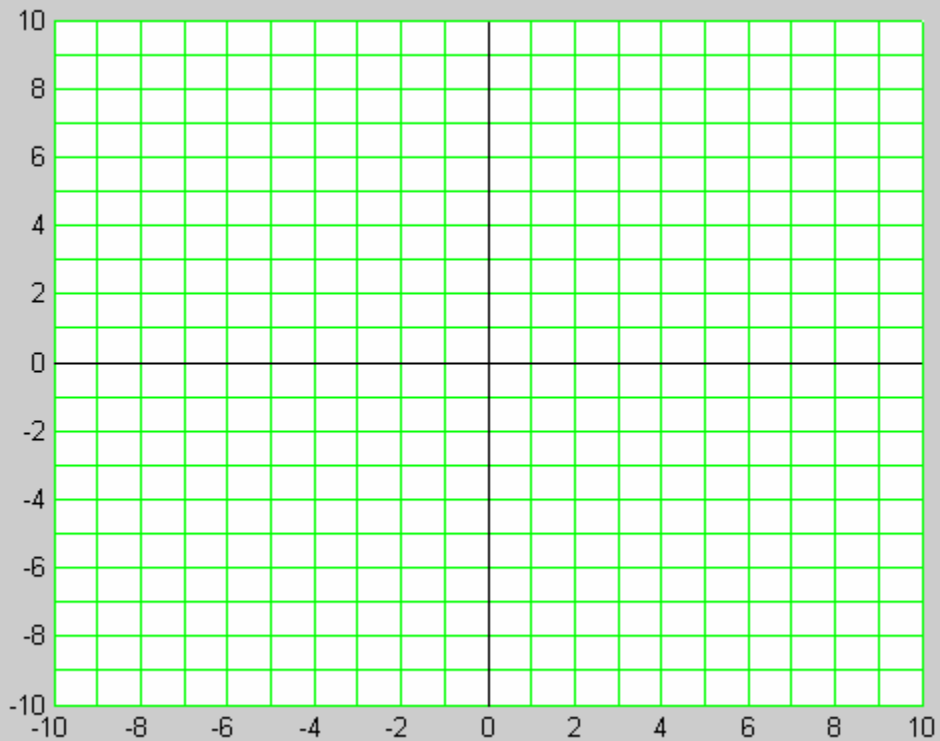
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**Math 100 Section G – Fall 2006
Final Examination**

1. Solve $-3x + 4 = 7 - x$.

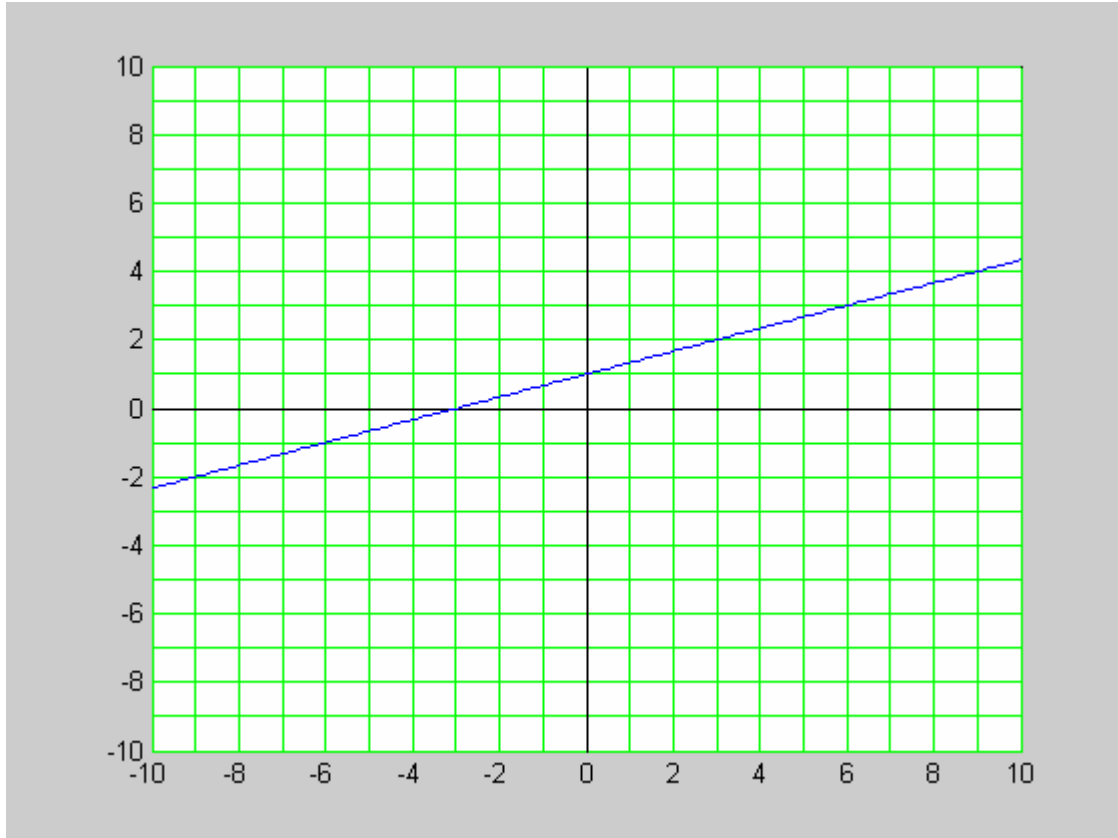
2. Given that $x = 2$ is the solution to $ax^2 + 3 = 5ax - 3$, what is a ?

3. Graph the line $y = 0.25x - 2$ on the axes below.



Name: _____

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



5. Solve (simplify) the inequality $5 + 2x \leq 3x - 2$.

Name: _____

6. There were approximately 44.8 million (detached, single-family) houses in the U.S. in 1970. In 2000, there were approximately 69.9 million such houses. Assuming the growth in houses is linear (which actually is a good model over the last 60 years), how many (detached, single-family) houses are there today?

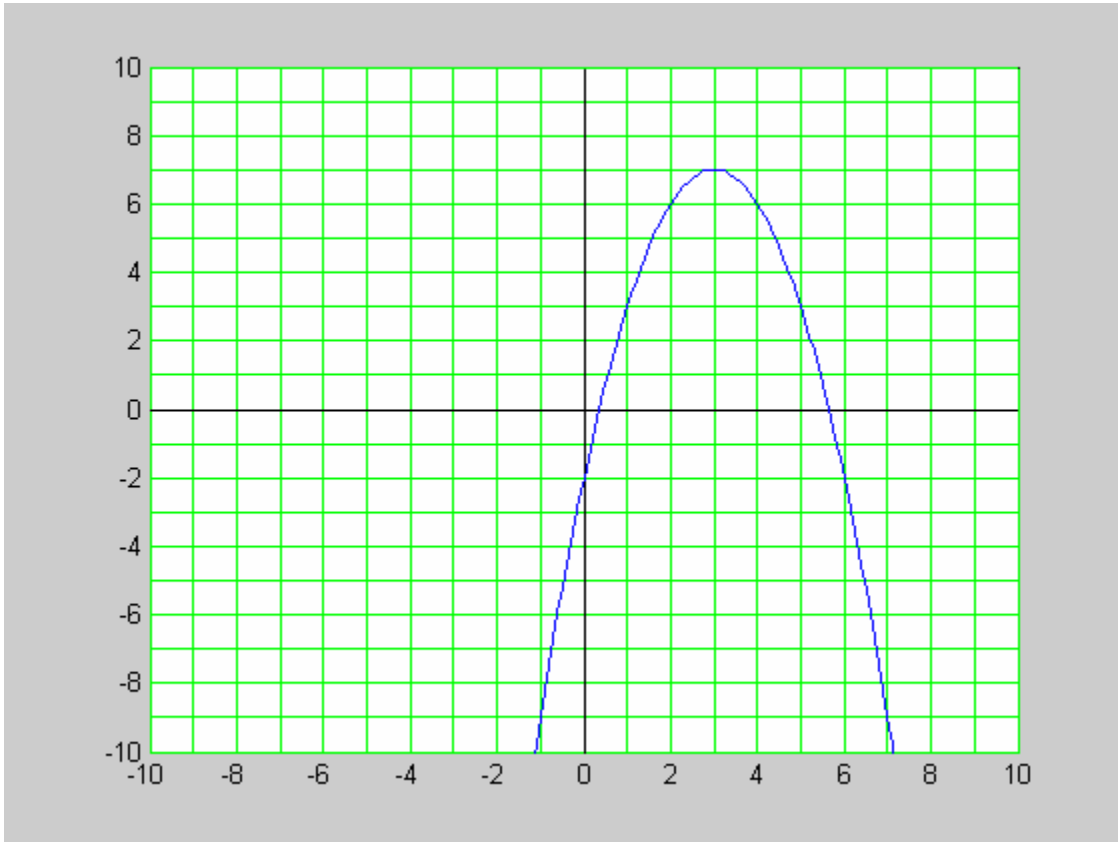
7. Solve $x^2 + 8x - 20 = 0$.

Name: _____

8. Suppose there is a demand for 150,000 gizmos but only a supply of 90,000 gizmos at a price of \$5. If the price increases to \$12, the supply will rise to 230,000 gizmos, but the demand will fall to only 80,000 gizmos. Assuming the supply and demand curves are actually straight lines, at what price will supply equal demand?

Name: _____

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



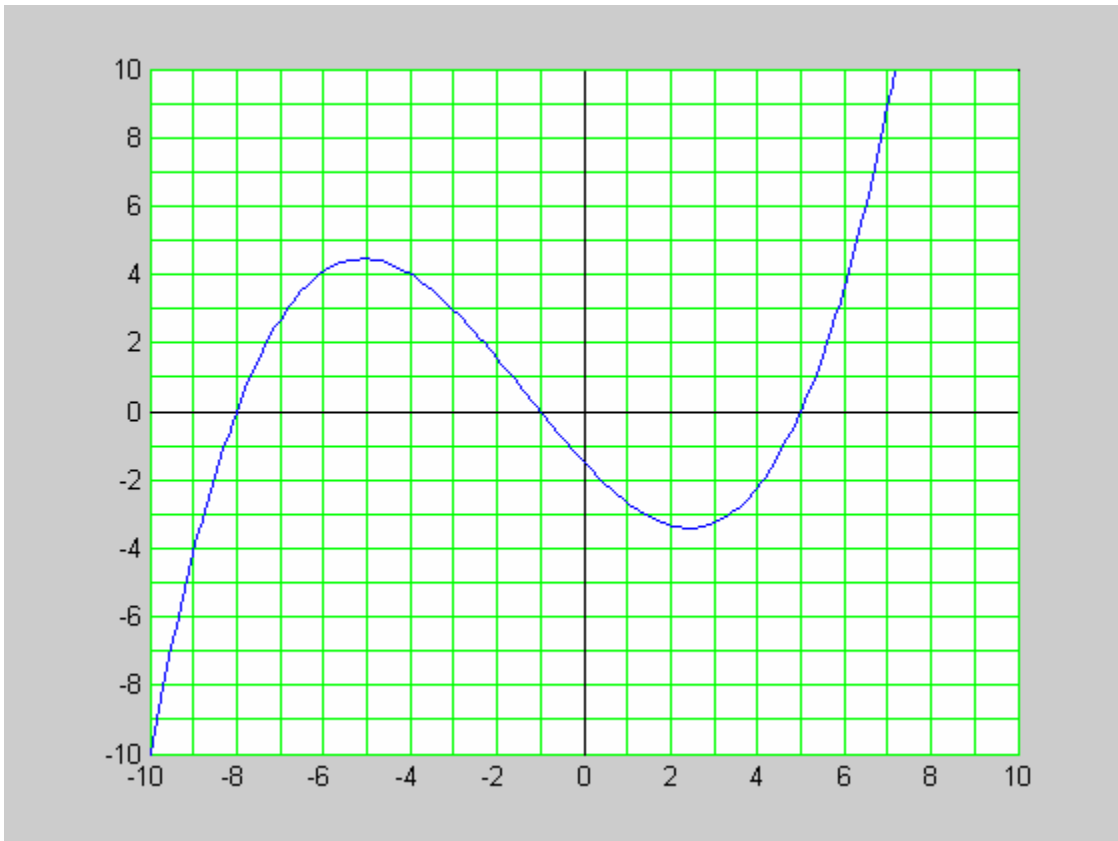
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10. Let $f(x) = x^2 + 4x - 2$ and $g(x) = 3x - 2$. Compute each of the following. You must simplify your answer for full credit.

a. $f(g(x))$

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

11. The graph of $y = f(x)$ is shown below. Note that the graph passes through the lattice points $(-8,0)$, $(-4,4)$, $(-1,0)$, and $(5,0)$. Draw the graph of $y = f(x-2) + 3$



Name: _____

12. The height of a ball thrown upward with initial velocity 10m/sec is $h(t) = 10t - 5t^2$.
What is the maximum height the ball reaches?

13. Solve the equation $|3x + 1| = 5x + 2$.

Name: _____

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

15. Suppose $f(x) = 6 - \sqrt{2x + 3}$. What is $f^{-1}(x)$?

Name: _____

16. Simplify the equation $y = 1000 \times 1.06^x$ by taking the logarithm of each side.

17. Suppose $\log(a) = 0.6$ and $\log(b) = -1.3$, what is $\log(a^2b)$?

18. Solve the equation $2e^{3x} - 8 = 4$.

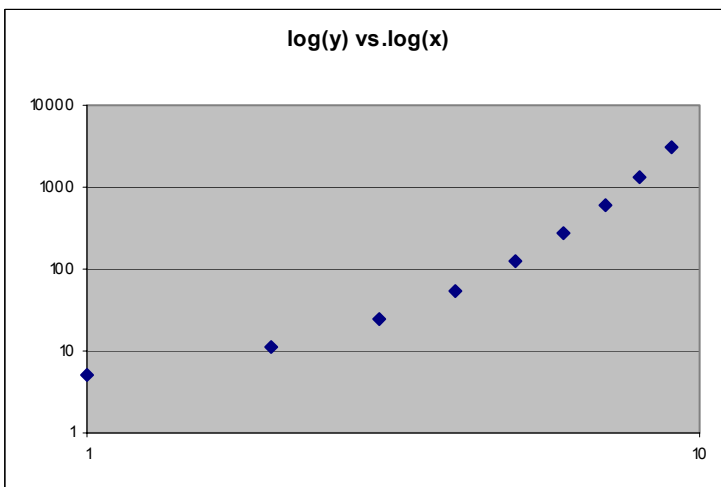
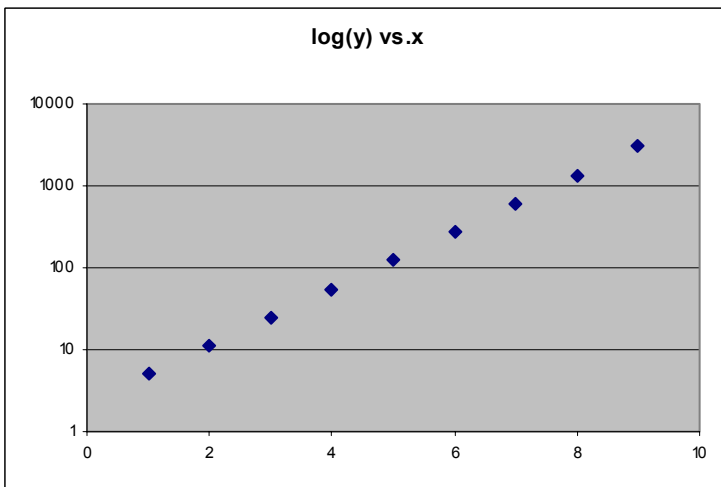
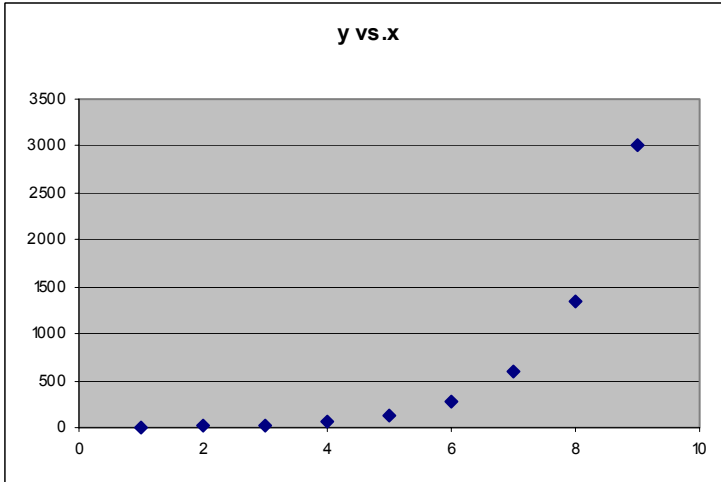
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19. What is the present value of a payment of \$150,000 to be made in 4 years, with a discount rate of 4% compounded quarterly?

20. Find all the solutions (real and complex) to $x^3 + 5x^2 - 3x + 1 = 2x + 2$. Hint: one solution is $x = 1$.

Name: _____

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?



Name: _____

22. Find a polynomial with single roots at $x = 5$ and $x = -1$ and a double root at $x = 1$. For full credit you must write the polynomial in standard form (i.e. $a_n x^n + \dots + a_1 x + a_0$).

Name: _____

23. Find a rational function with roots at $x = 2$ and $x = 3$, a pole at $x = -1$, and a horizontal asymptote as x tends to infinity (and negative infinity).

Name: _____

24. Solve the equation $\frac{x^2 + 3x + 4}{3x + 1} = \frac{x^2 - x + 4}{3x - 1}$.

Name: _____

25. Solve the system of equations: $x - y = 2$
 $2x + z = 3$. You must show how you checked
 $x + 5y + 4z = 4$

your work to receive full credit. Hint: $\begin{pmatrix} 1 & -1 & 0 \\ 2 & 0 & 1 \\ 1 & 5 & 4 \end{pmatrix}^{-1} = \begin{pmatrix} -2.5 & 2 & -0.5 \\ -3.5 & 2 & -0.5 \\ 5 & -3 & 1 \end{pmatrix}$.

Name: _____

26. Suppose $A = \begin{pmatrix} 1 & 3 & 4 \\ 2 & -1 & 7 \\ -5 & 0 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 3 \\ -2 & -7 \\ a & 1 \end{pmatrix}$. Compute each of the following, or state that they are not defined.

a. $A + B$

b. AB

c. BA

Name: _____

27. Suppose a farmer has 1200 acres of land and 990 acre-feet of irrigation water available. The farmer can plant a mixture of two crops, wheat, which requires 0.3 acre-feet of irrigation water per acre and soybeans, which require 1.5 acre-feet of irrigation water per acre. How many acres of each crop should be planted to make full use of all land and water rights?

Name: _____

28. Suppose an economy produces *goods* and *services*. To produce each unit of goods requires 0.5 units of goods and 0.2 units of services. To produce each unit of services requires 0.3 units of goods and 0.6 units of services. If the demand for services increases by 1 unit, how many more units of goods and services will need to be produced (remember that the economy will need to produce the goods and services that are consumed in producing the additional unit of service).

Name: _____

Pledge:

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

examination: _____

(signature)

(date)