Name:_____

MATH 1050 - Final Exam - Fall 2012 - Sections 2 and 3

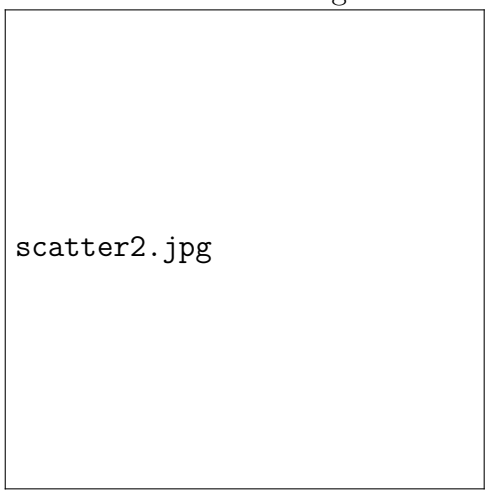
- Neatly write your solutions directly on the exam paper. If a solution requires more space than given, you may continue on the back of the page. Work on scratch paper will not be graded.
- *To receive full credit you must show all necessary work and provide clear explanations.*
- Books, notes, calculators, and computers are not allowed.

1. Each of these problems is worth 3 points. NO justification is required for these problems.

   (a) Classify the function with the values given in the table as linear, exponential, or neither.

x	y
2	4
3	6
4	9
5	13
6	18

   (b) Examine the scatter diagram and decide whether the relationship is linear or nonlinear.



   (c) Find the vertex of the quadratic function $f(x) = x^2 - 10x + 10$.

   (d) Evaluate $\log_6 \dfrac{1}{36}$

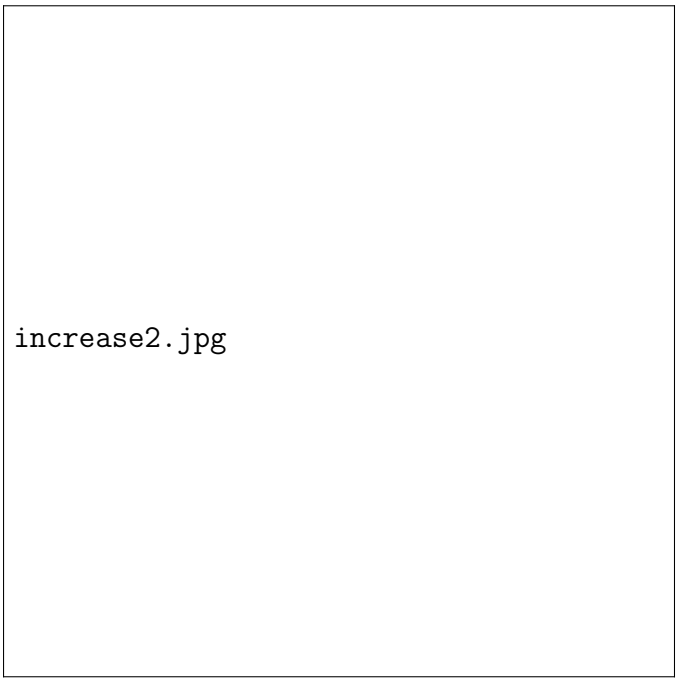
   (e) Write $\log_2(x+1) - 3\log_2 x$ as a single logarithm.

   (f) Is the sequence $48, -24, 12, -6, 3, \ldots$ arithmetic, geometric, or neither.

2. Find the equation of the line that goes through the point $(-3, 1)$ and is parallel to the line $y = \frac{2}{3}x + 4$.

3. Write the parabola $f(x) = -2x^2 + 12x + 24$ in standard form.

4. For the graph of $f(x)$, given below, find the following:



   (a) The domain of $f(x)$.

   (b) The range of $f(x)$.

   (c) The interval(s) on which $f(x)$ is increasing.

   (d) The interval(s) on which $f(x)$ is decreasing.

   (e) The local minima, if any.

   (f) The local maxima, if any.

5. For $p(x) = 3x^4 - 10x^3 + 6x^2 - 10x + 3$ do the following:

   (a) Use synthetic division to show that $\frac{1}{3}$ is a zero of $p(x)$.

   (b) Find all real zeros of $p(x)$.

   (c) Factor $p(x)$ over the real numbers.

   (d) Find all complex zeros of $p(x)$.

   (e) Factor $p(x)$ completely (over the complex numbers).

6. Solve $5^x = 6^{x-1}$

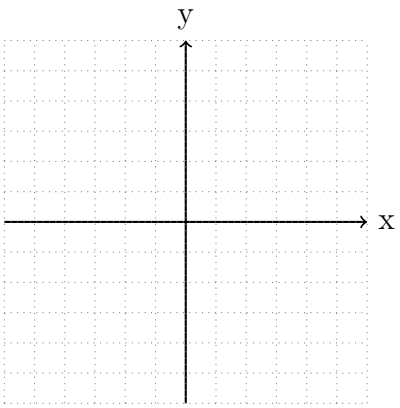
7. The function $f(x) = \sqrt[3]{7x-2}$ is one-to-one. Find its inverse.

8. Find the sum $\sum_{k=1}^{20}(4k-2)$.

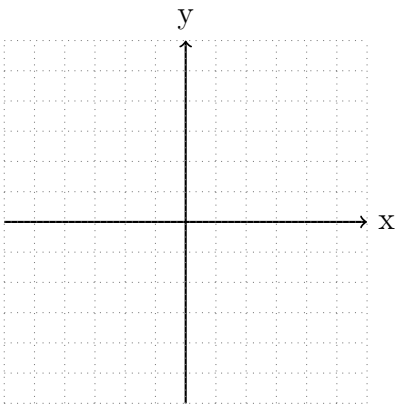
9. Find the formula for the n^{th} term of the series $24, 12, 6, 3, \ldots$.

10. For each of the functions below, graph the basic function (for example $y = x^2$). Then graph each function. Label at least two points on each graph, and any asymptotes.

(a) $f(x) = \sqrt[3]{2x-8}$ (Note: $2x - 8 = 2(x - 4)$)

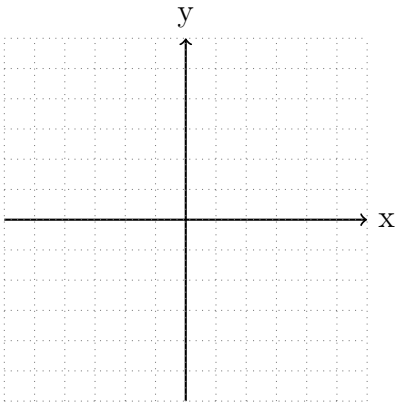


Basic Function

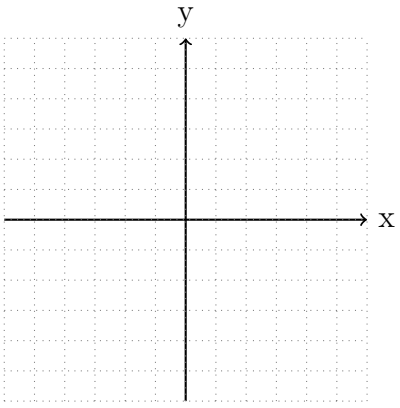


$f(x) = \sqrt[3]{2(x-4)}$

(b) $g(x) = -2e^{-x}$

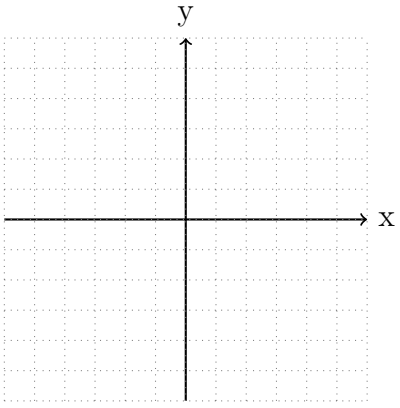


Basic Function

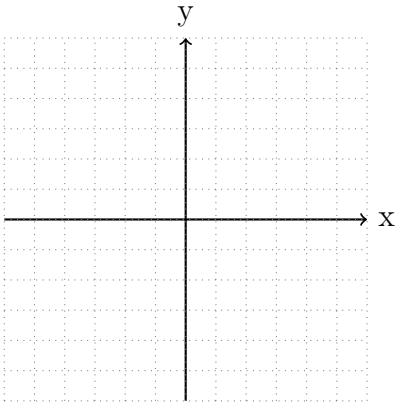


$g(x) = -2e^{-x}$

(c) $h(x) = 2(x-1)^5 - 3$

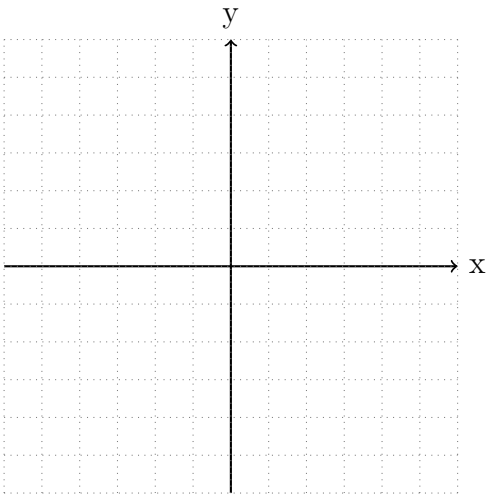


Basic Function

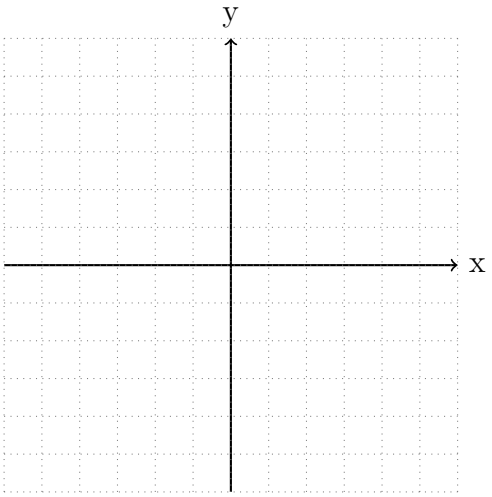


$h(x) = 2(x-1)^5 - 3$

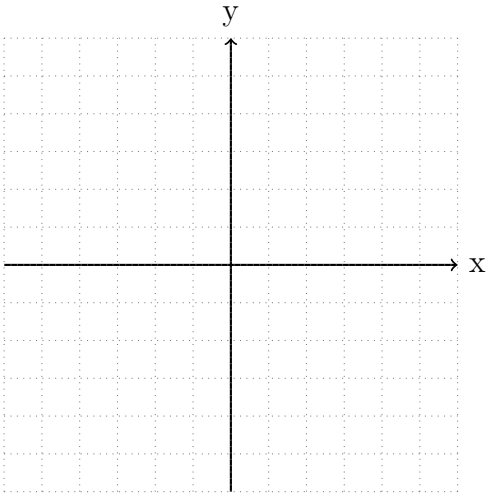
11. Graph the function $f(x) = \dfrac{x^2 - 1}{x^2 - x - 6}$. Label all intercepts and asymptotes.



12. Graph the function $q(x) = -(x-1)^3(x+2)^2$. Label all intercepts.



13. Graph the hyperbola $\dfrac{(y-3)^2}{4} - \dfrac{(x+1)^2}{4} = 1$. Label the center, vertices, foci, and asymptotes.



All these used in Exam 4 Released*

14. For the matrices $A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ 3 & 4 \end{bmatrix}$, find AB.

15. Use Cramer's rule to solve the linear system $\left\{ \begin{array}{rcrcl} 3x & - & 6y & = & 24 \\ -2x & + & 5y & = & -19 \end{array} \right\}$

16. Solve the system $\left\{ \begin{array}{rcrcrcl} x & - & y & - & 5z & = & -15 \\ 3x & + & y & + & z & = & -1 \\ x & + & y & +3z & & = & 7 \end{array} \right\}$

17. Solve the linear system $\left\{ \begin{array}{rcrl} 3x & - & 6y = & 7 \\ -2x & + & 5y = & 12 \end{array} \right\}$ using the following method:

(a) Write the linear system as a matrix equation $A\mathbf{x} = \mathbf{b}$.

(b) Find A^{-1}.

(c) Use the inverse matrix to solve the matrix equation for $\mathbf{x}$.

18. (6 pts) The matrix $\left[\begin{array}{cccc} 1 & 2 & 1 & 5 \\ 0 & 1 & 3 & 3 \\ 0 & 0 & 1 & 4 \end{array} \right]$ represents an augmented matrix for a linear system.

(a) Write the corresponding set of linear equations.

(b) Solve the system.

19. Find the inverse of the matrix $A = \left[\begin{array}{ccc} 1 & 2 & 0 \\ 0 & 1 & 3 \\ 0 & 0 & -1 \end{array} \right]$.