

Name _____

December 13, 2006

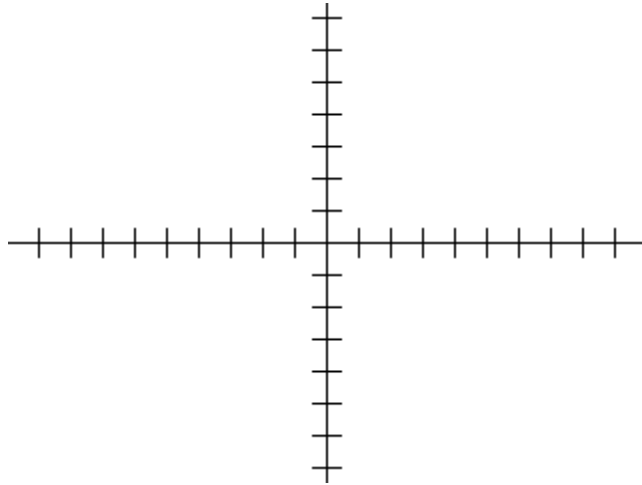
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Score (150 possible) _____

Final Exam

Answer each question to the best of your ability. Show all of your work.

1. a. Graph the line $2x + 3y = 6$. (5 points)
- b. Find the equation of a line perpendicular to $2x + 3y = 6$ through the point $(1, 2)$.
Graph this line with the graph of (a). (7 points)
Label each line with its equation.

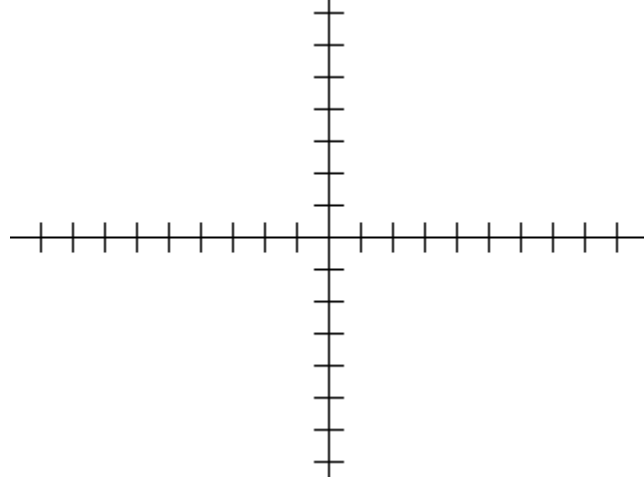


2. Solve $\frac{x+2}{x-1} < 3$. Write the solution set in interval notation. (10 points)

3. Let $f(x) = 5x + 6$. Find $f'(c)$, where c is a fixed constant, using the definition of derivative. (5 points)

4. Let $f(x) = \begin{cases} -3x+1 & \text{if } x < -1 \\ 0 & \text{if } x = -1 \\ x+5 & \text{if } x > -1 \end{cases}$

a. Graph the function $f(x)$ (7 points)



b. Find $\lim_{x \rightarrow -1^+} f(x)$ (5 points)

c. Find $\lim_{x \rightarrow -1^-} f(x)$ (5 points)

d. Is $f(x)$ continuous at $x = -1$? Why or why not? (3 points)

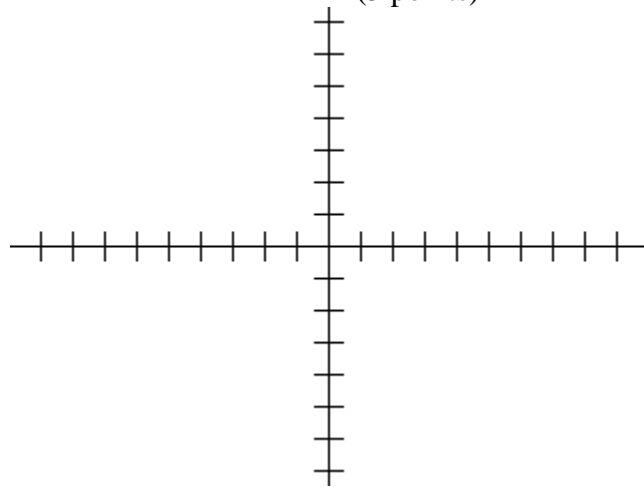
5. Find $\sin(x+y)$ given that $\cos x = \frac{2}{3}$ (x lies in quadrant I) and $\cos y = -\frac{4}{5}$ (y lies in quadrant III). (7 points)

6. Given the function $f(x) = x^3 - 3x^2 - 10x + 24$

- a. The degree of this polynomial is _____. (1 point)
- b. We should be looking for _____ zeros. (how many?) (1 point)
- c. What is the end behavior of the function? (2 points)

d. Find all of the factors of the function. (5 points)

e. Graph the function. (5 points)



f. Use synthetic division to find $f(3)$. (3 points)

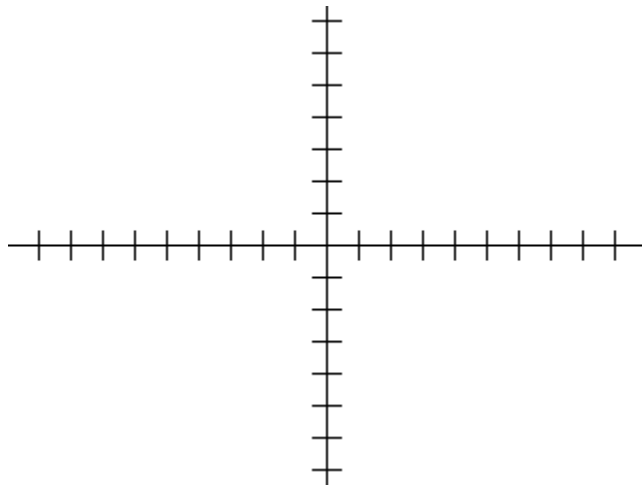
7. Given $f(x) = \frac{2x^2}{x^2 - 4x}$:

a. Find all asymptotes of this function. (5 points)

b. Does this function cross its non-vertical asymptote? Why or why not? (2 points)

c. Find all zeros of this function. (2 points)

d. Graph this function. (5 points)



8. Solve each of the following equations for x . (10 points each)

a. $\log_4(x+3) + \log_4(2-x) = 1$

b. $e^x + e^{-x} = 2$

9. Solve: $4x^2 + 5x = 6$. (5 points)

10. Find the inverse of the function $f(x) = \frac{3x-1}{3x+1}$. (5 points)

11. Graph the function $y = 2\sin(2x + \pi) - 1$ over two periods. (10 points)

12. Solve the trigonometric equation $\sin 2x = 1$ for all values of x with $0^\circ \leq x < 360^\circ$ (10 points)

13. Suppose you are told that the sides of a triangle measure 5 inches, 7 inches, and 8 inches. Describe (in detail) how you should go about solving for the measures of the angles. (10 points)

14. Apart from the origin, give an example of a point whose polar coordinates (r, θ) are the same as its rectangular coordinates (x, y) . Use formulas to show why your point works. (5 points)