

Math 108 Final Exam
May 11, 2015

Time: 2 hour and 30 minutes
Instructions: Show all work for full credit.
No outside materials or calculators allowed.
Extra Space: Use the backs of each sheet for extra space. Clearly label when doing so.

Name: _____

ID #: _____

Instructor/Section: _____

"I pledge by my honor that I have abided by the NJIT Academic Integrity Code."

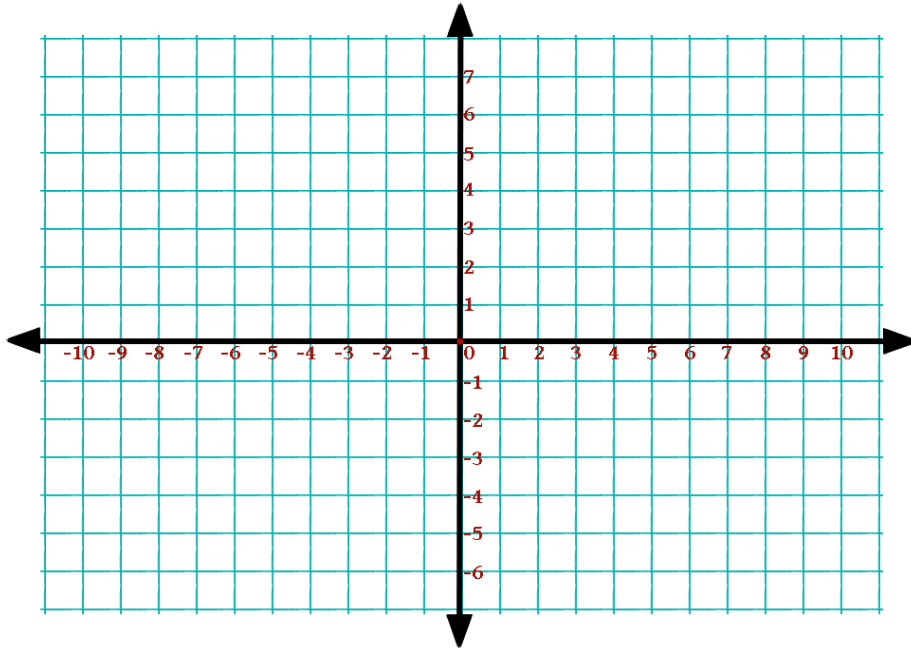
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Problem(s)	Score	

- 1) Find the equation of the line that is perpendicular to the line $y = -2$ passing through the point (3,4). **(3 points)**

1) _____

- 2) Find the equation of the line that passes through the given points. Then graph the line. $(2, -3), (-4, 9)$
(4 pts)



- 3) Determine whether the lines l_1 and l_2 passing through the pairs of points are parallel, perpendicular or neither. (5 points)

$$l_1 : (0, -1), (5, 9)$$

$$l_2 : (0, 3), (4, 1)$$

3) _____

4) Evaluate the following expressions if $f(x) = 2x + 1$ and $g(x) = x^2 + 2x - 1$: (4 points)

a) $(f + g)(x)$

4a) _____

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

4b) _____

c) $(f + g)(2)$

4c) _____

d) $(f - g)(2)$

4d) _____

5) Find the a) end behavior of the graph and the degree of the polynomial function. $f(x) = 6x^2 - 2x + 4x^3$
(3 points)

5a) $x \rightarrow \infty, y = P(x) \rightarrow$ _____
 $x \rightarrow -\infty, y = P(x) \rightarrow$ _____

5b) _____

6) Newton's Law of Gravitation says that two objects with masses m_1 and m_2 attract each other with a force F that is jointly proportional to their masses and inversely proportional to the square of the distance r between the objects. Express Newton's Law of Gravitation as an equation. **(5 points)**

6) _____

7) Boyles Law states that when a sample of gas is compressed at a constant temperature, the pressure of the gas is inversely proportional to the volume of gas. **(6 points)**

7a) Suppose the pressure of a sample of air that occupies $0.106m^3$ at 25° is 50kPa. Find the constant of proportionality, and write the equation.

7a) _____

7b) If the sample expands to a volume of $0.3m^3$, find the new pressure.

7b) _____

8) Solve each system of equations. (6 points)

a)
$$\begin{cases} x - y = 0 \\ 5x + 3y = 6 \end{cases}$$

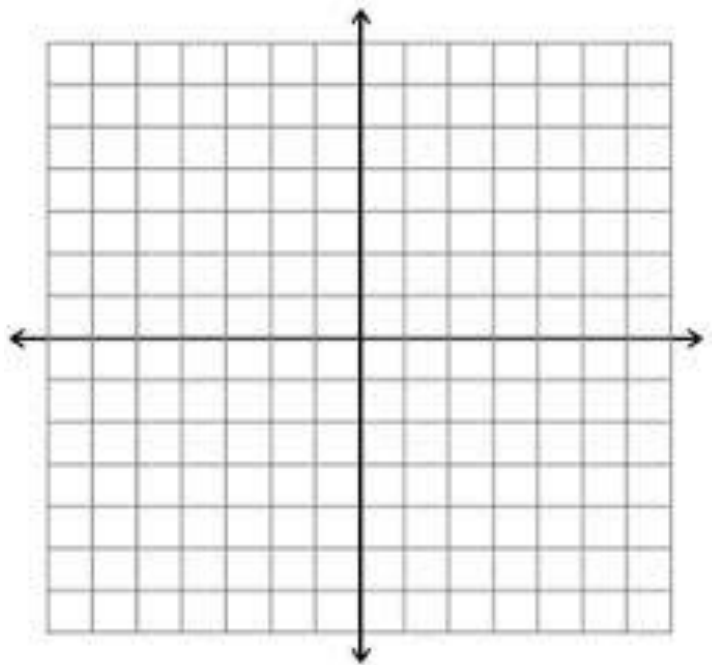
b)
$$\begin{cases} 5x + 3y = 9 \\ 2x - 4y = 14 \end{cases}$$

8a) _____

8b) _____

9) Find the standard form of equation of the parabola from the information below. Then graph the function. Be sure to label the vertex, axis of symmetry, the focus and the directrix. (6 points)

Vertex at (1,0) and focus at (2,0)



9) _____

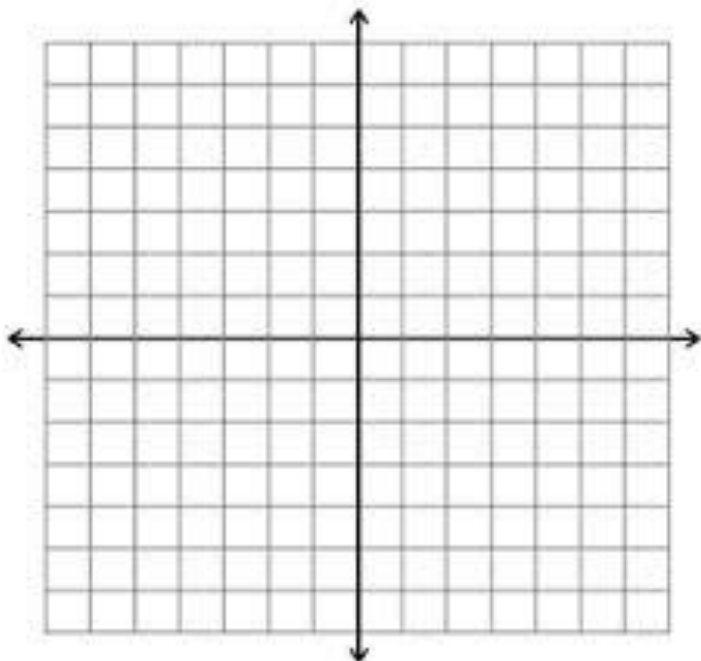
10) Identify each of the following exactly and then graph the function on the axes provided below. **(8 points)**

$$f(x) = \frac{x^2 + x - 2}{x^2 - x - 6}$$

a) $f(1) =$ _____

b) domain: _____

c) asymptote(s): _____



11. Solve the following inequality. You must show some analysis for full credit. $4x^2 - 5x > 6$ **(4 points)**

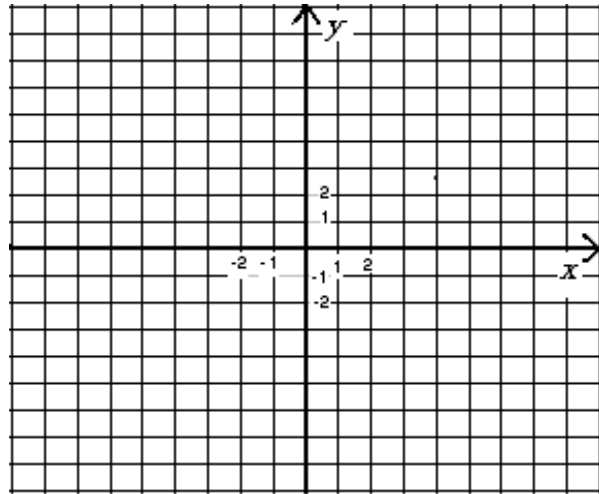
11) _____

12) Find the standard form of the equation of the hyperbola from the given information. Then find the center, vertices and foci of the hyperbola. Be sure to label the asymptotes. Then sketch the hyperbola.

Vertices at $(0,2)$, $(4,2)$; and foci at $(-1,2)$ and $(5,2)$

a) Standard form of the equation (3 pts): _____

b) Sketch the graph: (3 pts)



13) Perform the operation and write the result in standard form. (4 points)

a) $(\sqrt{3} + i\sqrt{15})(\sqrt{3} - i\sqrt{15})$

a) _____

b) $(8 + \sqrt{-18}) - (4 + 3i\sqrt{2})$

b) _____

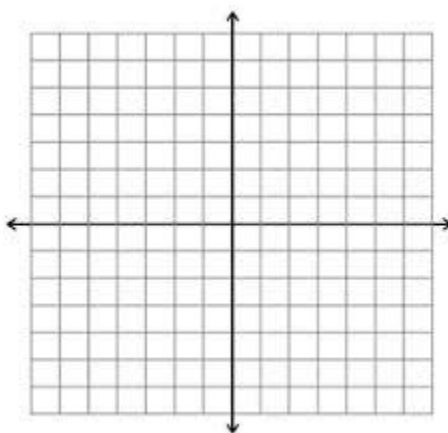
14) Divide $x^3 - 2x^2 - 9$ by $x - 3$. (2 points)

14) _____

15) Find all real solutions to the following equation. $2x^2 + x - 1 = 0$. (3 points)

15) _____

16) Put the equation of the circle in standard form $x^2 - 6x + y^2 - 2y + 6 = 0$ and then graph the equation. (8 points)



16) _____

17) Solve the following equations/inequalities. For C make sure your final answer is in interval notation. **(9 points)**

a) $\sqrt{2x+7} - x = 2$

17a) _____

b) $|3x+2| = 7$

17b) _____

c) $-3 \leq 6x - 1 \leq 3$

17c) _____

18) For the function $f(x) = -x^2 + x - 3$ find $\frac{f(x+h) - f(x)}{h}$. **(5 points)**

18) _____

19) Given $f(x) = x^2 - 1$ and $g(x) = x - 2$ find the following: **(6 points)**

a) $f \circ g(3)$

19a) _____

b) $g \circ f(3)$

19b) _____

c) $f \circ g(x)$

19c) _____

20) Find the inverse function algebraically of $f(x) = \frac{5-3x}{2}$. **(3 points)**

20) _____