Math 107 Final Exam
May 14, 2014

Time: 2 hour and 25 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."*

_____ (Signature)

Problem(s)	Score	Total

1. Simplify each expression. **(8 points)**:

a) $5x^4\left(x^2\right)$

b) $\left(4x^3\right)^0$

c) $6y^2\left(2y^0\right)^2$

d) $\dfrac{12\left(x+y\right)^3}{9\left(x+y\right)}$

2. Factor the following expressions. **(12 points)**

   a) $x^2 + 7x + 12$

2a) _____

   b) $27x^3 + 8$

2b) _____

   c) $5x^2 + 26x + 5$

2c) _____

3. Let $\log_a 9 = 1.5$ and $\log_a 6 = 1.2$. Evaluate each of the following:
(5 points)

x	81	6a	54	$\sqrt[4]{36}$	$9a^2$
$\log_a x$					

4. Find the exact value or state the value is undefined. Rationalize all denominators.
(4 points)

a) $\sin\left(-\dfrac{2\pi}{3}\right)$ _____

b) $\sin\dfrac{11\pi}{3}$ _____

c) $\tan\left(\dfrac{3\pi}{2}\right)$ _____

d) $\sec\dfrac{7\pi}{4}$ _____

5. Solve the following equations. **(9 points)**

a) $\dfrac{3x}{8} - \dfrac{4x}{3} = 4$

5a) _____

b) $10 - \dfrac{13}{x} = 4 + \dfrac{5}{x}$

5b) _____

c) $\dfrac{10x+3}{5x+6} = \dfrac{1}{2}$

5c) _____

6. A) Find the equation of each line in slope-intercept form. Then b) determine whether the lines are parallel, perpendicular or neither. **(6 points)**

$L_1 : (0,1),(5,9)$

$L_2 : (0,3),(4,1)$

6a) _____   6b) _____

7. Find the exact values of $\sin x$ and $\tan x$ with the given constraint. **(6 points)**

$\cos x = -\dfrac{4}{5}, \theta$ lies in Quadrant III

7) _____

8. Find the exact value of the given expression: $\cos\left(\dfrac{5\pi}{6} + \dfrac{\pi}{3}\right)$ **(6 points)**

8) _____

9. To approximate the length of a marsh a surveyor walks 10 yds from point A to point B, then turns 60° and walks 5 yards to point C. Approximate (round to the nearest tenth if necessary) the length of line AC of the marsh. Refer to the figure below.   **(10 points)**
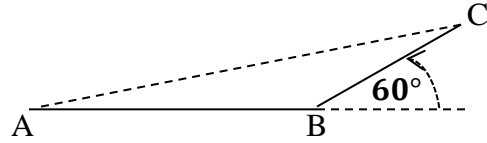
10. Graph one period of the function: $y = 3\sin(2x) - 1$. Identify the period and the amplitude.
(4 points)
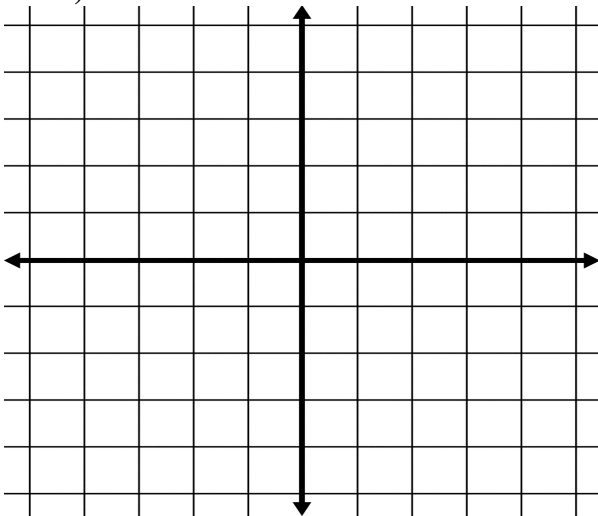
Period:_____   Amplitude:_____

11. Solve the following systems of equations. You may use any method. **(4 points)**
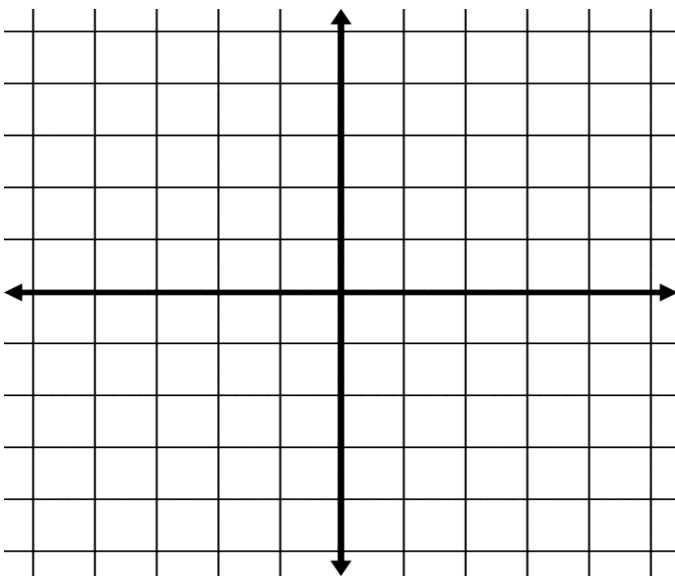
a) $\begin{cases} x+4y=3 \\ 2x-7y=-24 \end{cases}$

b) $\begin{cases} \dfrac{1}{5}x-\dfrac{1}{2}y=8 \\ x+y=20 \end{cases}$

11a) _____   11b) _____

12. Sketch the graph of the function: $y = \cos(x+\pi)+1$ Identify the period and amplitude.
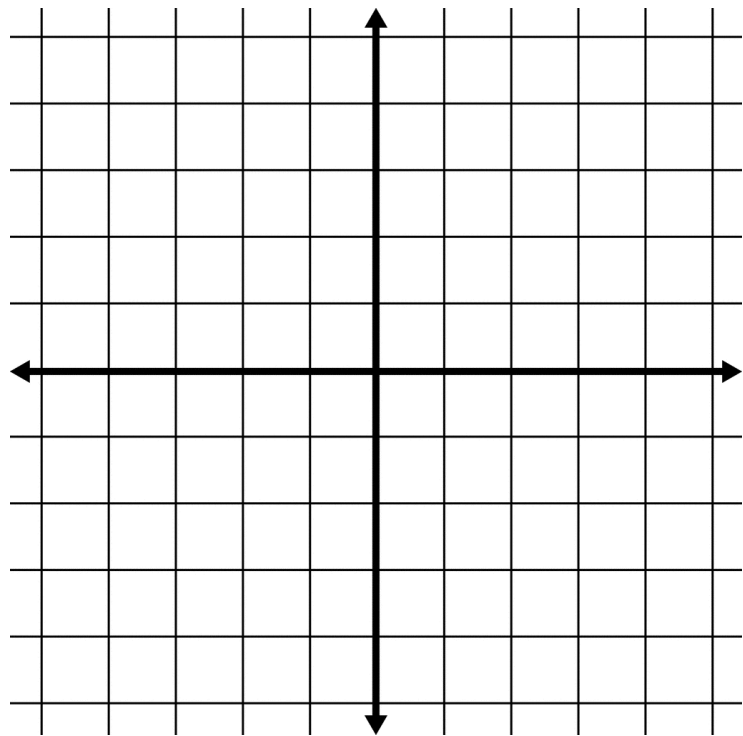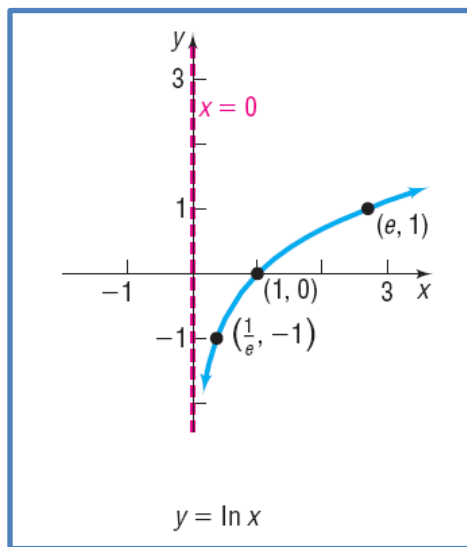**(4 points)**

Period:_____   Amplitude:_____

13. The length of a rectangular plot is three times its width. Assuming the area of the plot is 10,800 square feet, find the length and width. **(5 points)**
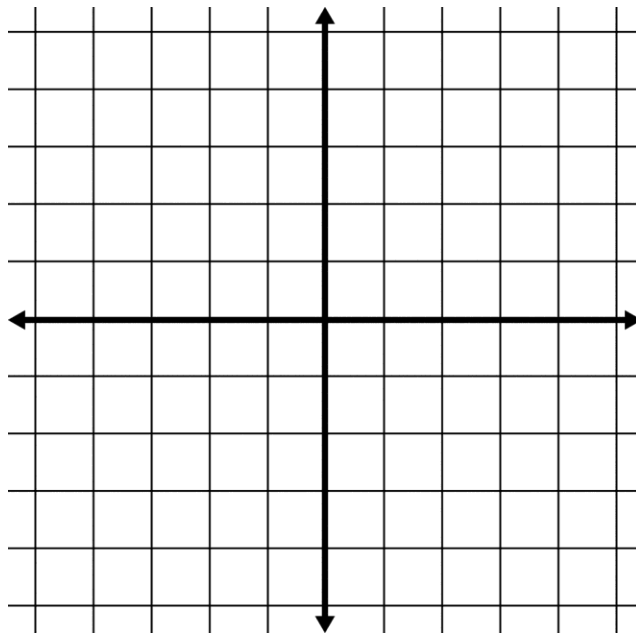
13)_____

14. Given the graph of $y = \ln x$ below, use transformations to sketch the graph of:

$y = \ln(x-1)+4$

Be sure to identify the asymptote and the y – intercept. **(3 points)**

15. Use any method discussed in class and sketch the graph of the quadratic function:
$f(x) = 2x^2 - x + 1$. Be sure to **identify and label the vertex, axis of symmetry and the intercepts. (6 points)**

16. Give the degree and describe the end behavior of the graph of the polynomial function.
$f(x) = 6 - 2x + 4x^2 - 5x^4$ (**4 points**)

$x \to \infty, y = P(x) \to$ _____

$x \to -\infty, y = P(x) \to$ _____

16)_____

17. Evaluate the given logarithmic expressions. **(4 points)**

    a) $\log_3 81 = $ _____

    c) $\ln 1 = $ _____

    b) $\log_{64} 8 = $ _____

    d) $\log_7 343 = $ _____