Math 1120F - Exam 3

Name: KEY

Friday, November 21, 2014
Time: 30 minutes
Instructor: Brittany Cuchta

Instructions:

- Do not open the exam until I say you may.
- All cell phones and other electronic noisemaking devices must be turned off or completely silenced (i.e., not on vibrate) for the duration of the exam.
- **No calculators** are allowed on the exam.
- The exam *must* be taken in pencil. Using a pen on the exam will result in the loss of points.
- Failure to follow directions specific to a problem will result in the loss of points.
- Circle or box your final answer where appropriate. Put your final answer in the provided space when available. Failure to do so will result in points being deducted.
- Show **all** work. Full credit will only be given if work is shown which **fully and clearly** justifies your answer. I reserve the right to not grade a problem which I cannot read.
- Answers must be exact (like $\sqrt{2}$), not approximate (like 1.414), unless a problem specifically indicates otherwise.
- All final answers must be simplified unless otherwise specified. **Rationalization is not required unless otherwise specified.**
- If you run out of room, use the back of the page and indicate this on the question.
- As always, you are expected to exhibit academic integrity during the exam.

Page:	1	2	3	Total
Points:	21	16	13	50
Score:				

1. (8 points) Circle true or false for the following questions. Partial credit will not be given.

   (a) True (False) : If y varies directly with x then there exists a constant k such that $y = \frac{k}{x}$

   (b) True (False) : The center of the circle $(x+3)^2 + (y-2)^2 = 5$ is $(3, -2)$.

   (c) True (False) : Perpendicular lines have slopes that are reciprocals of one another.

   (d) True (False) : If a graph is symmetric with respect to the x-axis then it cannot be symmetric with respect to the y-axis.

2. (8 points) Complete the following statements by filling in the blank with the correct answer. Note that partial credit will not be given.

   (a) If the graph of an equation is symmetric with respect to the origin and the point (3,-4) is a point on the graph, then (-3, 4) is also a point on the graph.

   (b) The lines $y = 2x + 5$ and $y = ax + 2$ are parallel if $a =$ 2.

   (c) If x and y are two quantities, then y is directly proportional to x if there exists a constant k such that $y = kx$.

   (d) The slope of a vertical line is undefined.

3. (5 points) The current I in a circuit is inversely proportional to its resistance Z, measured in ohms. Suppose that when the current in a given circuit is 30 amperes the resistance is 8 ohms. Write an equation that describes the current in terms of resistance; be sure to clearly define any variables you use. Then, use this equation to find the current in the circuit when the resistance is 10 ohms.

$I = \frac{k}{Z}$

$30 = \frac{k}{8}$

$k = 240$

when $Z = 10$:

$I = \frac{240}{10}$

$I = 24$

Equation: $I = \frac{240}{Z}$

Solution: $I = 24$ amp.

4. (10 points) For the points $(-1, 2)$, $(1, 3)$, find (a) the distance between them; (b) their midpoint; (c) the equation of the line containing them; and (d) any intercepts of the line containing them.

a) $d = \sqrt{(-1-1)^2+(2-3)^2} = \sqrt{(-2)^2+(-1)^2} = \sqrt{5}$

b) $M = \left(\frac{-1+1}{2}, \frac{2+3}{2}\right) = \left(0, \frac{5}{2}\right)$

c) $m = \frac{y_2-y_1}{x_2-x_1} = \frac{3-2}{1+1} = \frac{1}{2}$

$y-2 = \frac{1}{2}(x+1)$

$y-2 = \frac{1}{2}x+\frac{1}{2}$

$y = \frac{1}{2}x+\frac{5}{2}$

Distance: $\sqrt{5}$

Midpoint: $\left(0, \frac{5}{2}\right)$

Equation: $y = \frac{1}{2}x+\frac{5}{2}$

d) y-int: $\left(0, \frac{5}{2}\right)$

x-int: $(-5, 0)$

Intercepts: $\left(0, \frac{5}{2}\right)$, $(-5, 0)$

5. (6 points) Test the following for any symmetry. Circle yes or no for each option. Failure to show clear, sufficient work will result in **no points** being awarded.

$$y = \frac{3x^3 + x}{x^2 + 1}$$

x-axis:

$-y = \frac{3x^3+x}{x^2+1}$ not equivalent

y-axis:

$y = \frac{3(-x)^3+(-x)}{(-x)^2+1} = \frac{-3x^3-x}{x^2+1}$ not equivalent

origin:

$-y = \frac{3(-x)^3+(-x)}{(-x)^2+1} = \frac{-3x^3-x}{x^2+1}$

$-y = -\frac{(3x^3+x)}{x^2+1}$ equivalent

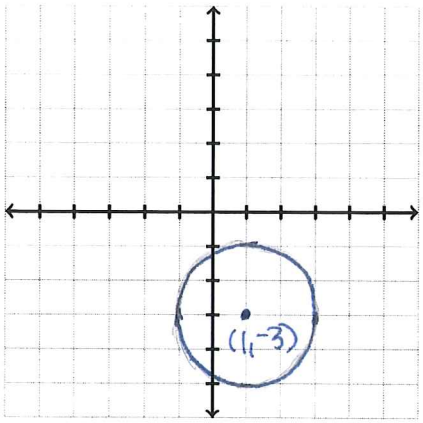
x-axis symmetry: Yes (No)

y-axis symmetry: Yes (No)

origin symmetry: (Yes) No

6. (8 points) Find the center, radius, and any intercepts of the following circle. Graph the equation. Clearly label the center.

$$x^2 - 2x + y^2 + 6y + 6 = 0$$



$(x^2-2x) + (y^2+6y) = -6$

$(x^2-2x+1) + (y^2+6y+9) = -6+1+9$

$(x-1)^2 + (y+3)^2 = 4$

Center: $(1,-3)$

Radius: 2

X-int: $(x-1)^2 + (3)^2 = 4$

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

no real solution

y-int: $(-1)^2 + (y+3)^2 = 4$

$y+3 = \pm\sqrt{3}$

$y = -3 \pm \sqrt{3}$

Center: $(1,-3)$

Radius: 2

Intercepts: $(0, -3 \pm \sqrt{3})$

7. (5 points) Find the equation of the line perpendicular to $3x - y = -4$ containing the point (-2,4).

$3x - y = -4$

$-y = -3x - 4$

$y = 3x + 4$

$m_1 = 3$

$m_2 = -\frac{1}{3}$

$y - 4 = -\frac{1}{3}(x+2)$

$y - 4 = -\frac{1}{3}x - \frac{2}{3}$

$y = -\frac{1}{3}x + \frac{10}{3}$

Equation: $y = -\frac{1}{3}x + \frac{10}{3}$