York University

Faculty of Science and Engineering

Math 1505

Class Test 1 Version A

NAME (print): _____
(Family) (Given)

SIGNATURE: _____

STUDENT NUMBER: _____

SOLUTIONS

Instructions:

1. Time allowed: 50 minutes.
2. **NO CALCULATORS OR OTHER AIDS PERMITTED**
3. Show your work. Your work must justify any **answers** you give. Use **page** backs for any scrap work.
4. Use pen to fill in cover. If you use pencil for your solutions, you may not submit your paper for regrading.
5. There are 11 questions on 7 pages.

Question	Points	Marks
1	4	
2	4	
3	4	
4	6	
5	6	
6	4	
7	4	
8	4	
9	4	
10	6	
11	4	
Total	50	

1. (4 points) Solve $|3 - 4x| \geq 2$. Express your answer in interval notation.

$4x - 3 \leq -2$

$4x \leq 1$

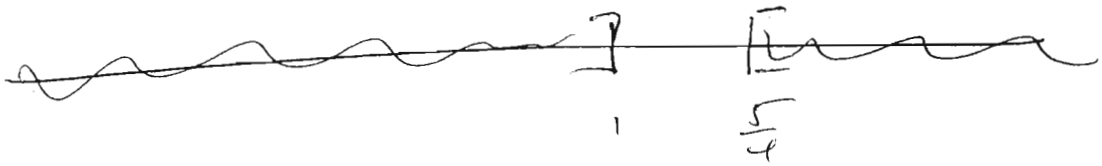
$x \leq 1$

or

$4x - 3 \geq 2$

$4x \geq 5$

$x \geq \frac{5}{4}$



$(-\infty, 1] \cup [\frac{5}{4}, \infty)$

2. (4 points) Solve $|5x + 2| = |2x - 4|$.

$5x + 2 = 2x - 4$

$3x = -6$

$x = -2$

$5x + 2 = -(2x -$

$5x + 2 = -2x + 4$

$7x = 2$

$x = \frac{2}{7}$

3. (4 points) Find the equation of the line through $(1, -3)$ perpendicular to $x - 2y + 5 = 0$.

slope $= \frac{1}{2}$

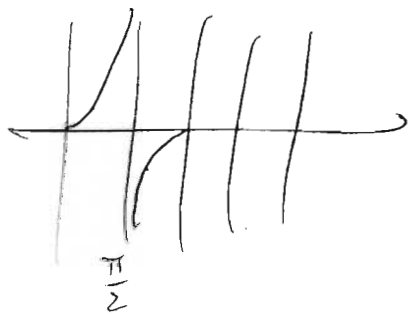
$y + 3 = -2(x - 1)$

4. (6 points) Find all values of θ on the interval $[0, 2\pi)$ that satisfy $\tan\theta \sin\theta + \sin\theta = 0$.

$\sin\theta(\tan\theta + 1) = 0$

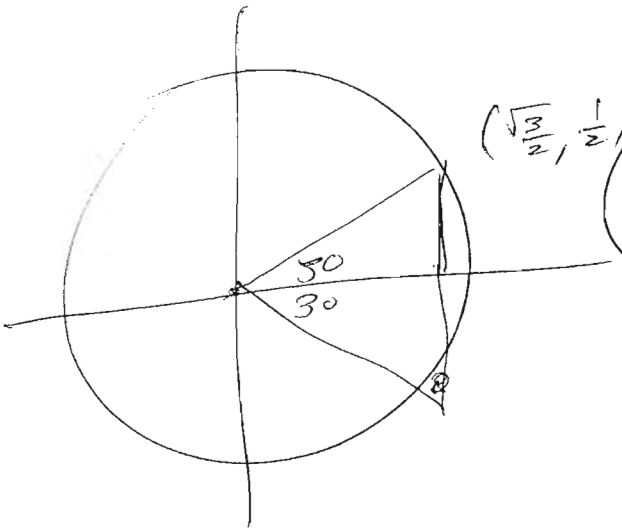
$\sin\theta = 0$ $\quad \theta = 0, \pi$

$\tan\theta = -1$ $\quad \theta = \frac{3\pi}{4}, \frac{7\pi}{4}$



5. (6 points) Find all values of θ on the interval $[0, 2\pi)$ that satisfy

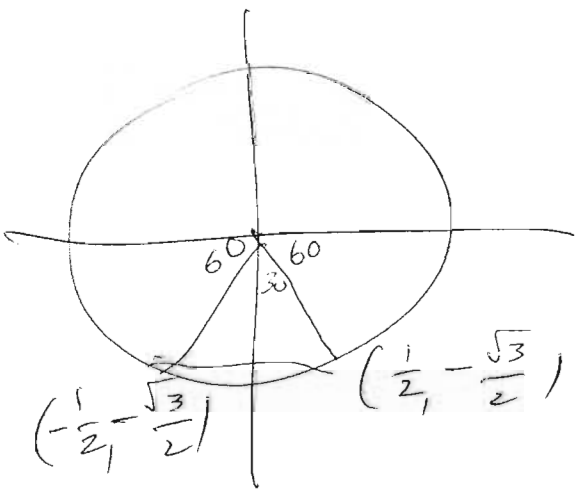
(a) $\cos\theta = \frac{\sqrt{3}}{2}$.



$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

$\theta = \frac{\pi}{6}, \frac{11\pi}{6}$

(b) $\sin\theta = -\frac{\sqrt{3}}{2}$.



$\theta = \frac{4\pi}{3}, \frac{5\pi}{3}$

6. (4 points) Find the center and radius of the circle with equation $x^2 + y^2 - 4x + 6y + 4 = 0$.

$(x-2)^2 - 4 + (y+3)^2 - 9 + 4 = 0$

$(x-2)^2 + (y+3)^2 = 9 = 3^2$

Center $(2, -3)$

Radius 3

7. (4 points) Find the largest possible domain of the function $\frac{\sqrt{x+2}}{x^2+x}$. Express your answer in interval notation.

$x^2 + x = x(x+1)$

$x \geq -2 \qquad x \neq 0, -1$

$[-2, -1) \cup (-1, 0) \cup (0, \infty)$

10. (6 points) Assume that a radioactive substance decays after t days to the amount $A(t) = 60 \cdot 3^{-t}$. What is the half life of the substance?
Note: Write an expression for your answer. A numerical solution is not required.

$30 = 60 \cdot 3^{-t}$

$3^{-t} = \frac{1}{2}$

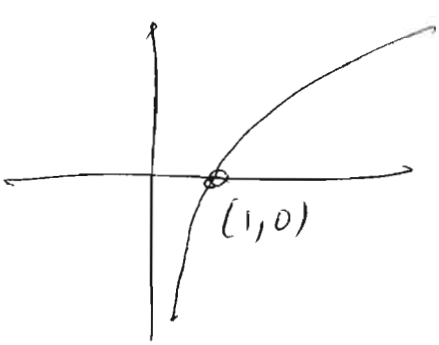
~~$-t \ln 3 = \ln \frac{1}{2}$~~

$3^{t} = 2$

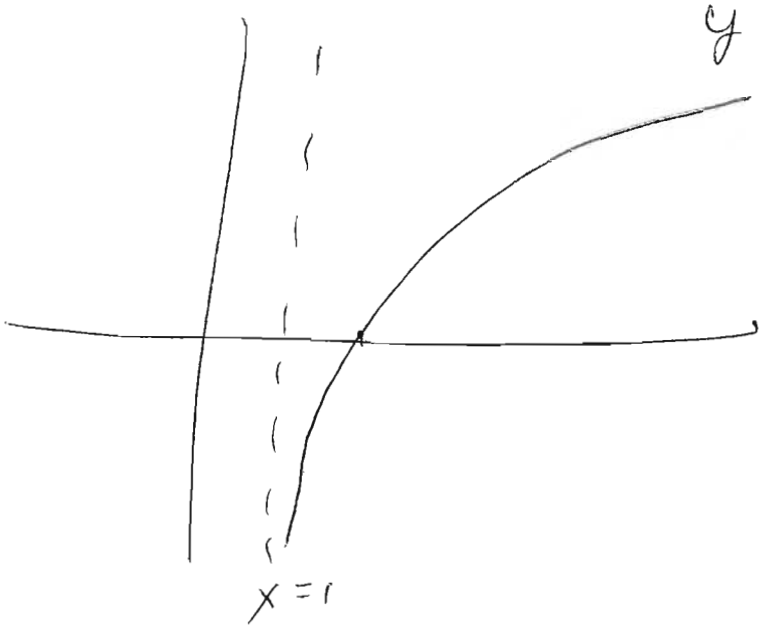
$t \ln 3 = \ln 2$

$t = \frac{\ln 2}{\ln 3}$ or equivalent

8. (4 points) Sketch the graph of $y = \ln(x)$ and the graph of $y = 2\ln(x-1)$. Label the x-intercept in each case.



$y = \ln(x)$



$y = 2\ln(x-1)$

9. (4 points) Simplify $e^{\ln(7+3x)-2\ln(x)-\ln(5)}$.

$$e^{\ln\left(\frac{7+3x}{5x^2}\right)} = \frac{7+3x}{5x^2}$$

11. (4 points) Let $f(x) = 3x - 7$. Find a formula for $f^{-1}(x)$.

$$x = 3y - 7$$
$$x + 7 = 3y$$
$$y = \frac{1}{3}(x+7)$$

$$f^{-1}(x) = \frac{1}{3}(x+7)$$

The end