Math 1271 - Lectures 010 and 030 **Name (Print):** Lydia Rose
Fall 2017
Quiz 8C
11/07/17
Time Limit: 25 Minutes Teaching Assistant David DeMark

You may *not* use your books, notes, graphing calculator, phones or any other internet devices on this exam.

You are required to show your work on each problem on this quiz.

Problem	Points	Score
1	3	2
2	4	3.75
3	3	1.5
Total:	10	~~6.50~~ 7.25

1. (3 points) Starting with the initial guess $x_1 = -2$, use Newton's method to approximate a root to the equation $e^x + x^2 - 3 = 0$ to eight decimal places.

$$X_{n+1} = X_n - \frac{f(x)}{f'(x)} \qquad f'(x) = e^x + 2x$$

+2

$$X_2 = -1.70622671 = -2 - \frac{e^{-2} + 4 - 3}{e^{-2} - 4} = -2 - \frac{e^{-2} + 1}{e^{-2} - 4}$$

$$X_3 = -1.70622671 - \frac{e^{-1.70622671} + (-1.70622671)^2 - 3}{e^{-1.70622671} + 2(-1.70622671)}$$

I did not have enough time to type this into a scientific calculator. I do know what I'm doing.

I buy that.

2. (4 points) If 600π cm^2 material is available to make a cylinder with an open top, find the largest possible volume of the cylinder.
Hint: The surface area of a cylinder with an open top is $\pi r^2 + 2\pi rh$, where r is the base radius, h is the height.

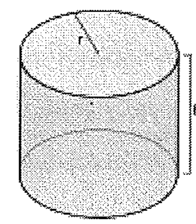
$A = \pi r^2 + 2\pi h r = 600\pi$

+3.5

$r^2 + 2h = 600$

$h = \frac{600 - r^2}{2}$

there is the problem.



$V = 2\pi r^2 h$

$V = 2\pi r^2 \left(\frac{600 - r^2}{2}\right)$

$V' = 4\pi r \left(\frac{600 - r^2}{2}\right) + 2\pi r^2 (-r) = 2\pi r (600 - r^2 - r^2) = 2\pi r (600 - 2r^2)$

$= 4\pi r (300 - r^2)$

$V' = 0$ at $r = 0, \pm 10\sqrt{3}$

$V'' = 4\pi (300 - r^2) + 4\pi r(-2r) = 4\pi (300 - r^2 - 2r^2) = 4\pi (300 - 3r^2)$

$= 12\pi (100 - r^2)$

$-10\sqrt{3}$	0	$10\sqrt{3}$
$-$	$+$	$-$

r can not be (−) so

$V = 2\pi (10\sqrt{3})^2 \left(\frac{600 - (10\sqrt{3})^2}{2}\right) = \boxed{90{,}000\pi \text{ cm}^3}$

3. (3 points) Show that the curve $y = \sqrt{x^2 + 5} + 2x$ has one slant asymptote at $y = 3x$ and one horizontal asymptote at $y = 0$.

$\lim_{x \to \infty} f(x) - mx = b$

+1.5

$y = \sqrt{x^2 + 5} + 2x$

$\lim_{x \to \infty} \sqrt{x^2 + 5} + 2x - 3x = \lim_{x \to \infty} \sqrt{x^2 + 5} - x \approx 0$ ✓

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

Therefore there is a slant asymptote at $y = 3x$

$\lim_{x \to \infty} \frac{1}{\sqrt{x^2 + 3}} + 2 = 2$

therefore there is a horizontal asymptote at $y = 0$

should be in other direction