Math 1271 - Lectures 010 and 030
Fall 2017
Quiz 8C
11/07/17
Time Limit: 25 Minutes

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Teaching Assistant ____________

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	1.25
2	4	3.5
3	3	2
Total:	10	6.75

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.

Newton's Method: $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$

$f(x) = e^x + x^2 - 3$
$f'(x) = e^x + 2x$

$X_2 = -2 - \left(\frac{e^{(-2)} + (-2)^2 - (3)}{e^{(-2)} + 2(-2)}\right) \rightarrow X_2 = -0.29377329$

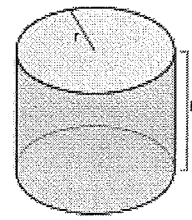
(2nd root approximation)

+1.25

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 $\pi r^2 + 2\pi r h$, where r is the base radius, h is the height.

$V = \pi r^2 h$

+3.5



$SA = \pi r^2 + 2\pi r h$

$V = \pi r^2 h$

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

$\dfrac{600\pi - \pi r^2}{2\pi r} = h$

Substitute

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

something went wrong here

Simplify: $V = r\left(\dfrac{600 - r}{2}\right) \rightarrow V = r(300 - r)$

$V = 300r - r^2$

Different. $V' = 300 - r$

$r = 300$

$SA = \pi r^2 + 2\pi r h$

$600\pi = \pi(300)^2 + 2\pi(300)h$

$\dfrac{600\pi - \pi(300)^2}{2\pi(300)} = h$

$\dfrac{600\pi - 90000\pi}{600\pi}$

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 $y = 0$.

NO

If $y = \sqrt{x^2+5} + 2x$, then $\cancel{y = \sqrt{x^2} + \sqrt{5} + 2x}$ which simplifies to $y = x + \sqrt{5} + 2x$ or $y = 3x + \sqrt{5}$. As the $\lim\limits_{x\to\infty}$ approaches larger x-values, the 3x term will dominate the function and the $\sqrt{5}$ shift won't really matter. Thus, for the linear equation $y = 3x + \sqrt{5}$, a slant asymptote will occur at $y = 3x$.

+1.25

need an actual limit computation

Horizontal Asymptote: when slope = 0 / y = c

+.75

$y = (x^2+5)^{1/2} + 2x$

$y' = \dfrac{2}{2(\sqrt{x^2+5})} + 2$

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

$y' = \dfrac{1}{x+\sqrt{5}}$ as x approaches ∞, the slope becomes 0

need a bit more than just slope, but this would work to show it also