

Math 1271 - Lectures 010 and 030

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Fall 2017

Quiz 8C

11/07/17

Time Limit: 25 Minutes

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	3
2	4	3.25
3	3	
Total:	10	6.25

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.

$$f(x) = e^x + x^2 - 3 \quad f'(x) = e^x + 2x \quad x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$$

$$x_2 = -2 - \frac{1.135335283}{-3.861664717} \rightarrow x_2 = -1.706226706$$

$$x_3 = -1.706226706 - \left(\frac{0.092759111}{-3.73090887} \right)$$

+3

$$x_3 = -1.677516748$$

$$x_4 = -1.677232736$$

$$x_5 = -1.677232709$$

$$x_6 = -1.677232709$$

$$x_6 = -1.67723270$$

2. (4 points) If 600π cm² 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.

$$S.A. = \pi r^2 + 2\pi rh$$

$$V = \pi r^2 h$$

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

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

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

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

$$\rightarrow V' = \frac{600\pi - \pi r^2}{2} - \frac{\pi r^2 \cdot 2}{1}$$

$$V' = \frac{600\pi - 3\pi r^2}{2} \rightarrow \frac{600\pi}{3\pi} = \frac{3\pi r^2}{3\pi}$$

$$\sqrt{200} \quad 200 = r^2 \quad r = \sqrt{200}$$

$$h = \frac{600 - 200}{2\sqrt{200}} \rightarrow \frac{400}{2\sqrt{200}} \rightarrow \frac{400}{2\sqrt{200}} \rightarrow h = \frac{200}{\sqrt{200}}$$

$$V = ?$$

$$+3.75$$

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 $y = 0$.

$$y = (x^2 + 5)^{\frac{1}{2}} + 2x \rightarrow y = \frac{2x}{(x^2 + 5)^{\frac{1}{2}}}$$

Domain: \mathbb{R} odd function

$$y' = \frac{2(x^2 + 5)^{-\frac{1}{2}} - 8x^2(x^2 + 5)^{-\frac{3}{2}}}{(x^2 + 5)^2}$$

$\rightarrow 0$

$$\lim_{x \rightarrow \infty} y = 3x$$

$$\lim_{x \rightarrow -\infty} y = 0$$

$$\lim_{x \rightarrow \infty} y = 0$$

$$\lim_{x \rightarrow -\infty} y = 3x$$