

Name: _____

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Please circle your instructor's name:

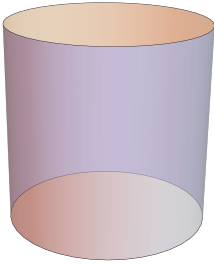
James Gossell

Gordon Williams

There are 25 points possible on this quiz. Any outside materials are not allowed. **For full credit, show all work clearly.**

1. [10 points] Find the radius, r , and the height, h , of the closed cylinder with volume of 16π that has the least amount of surface area. The formulas for the volume, V , and the surface area, S , are given below.

$$V = \pi r^2 h, \quad S = 2\pi r h + 2\pi r^2$$



2. [6 points] Solve the initial value problems given below.

a. Suppose $f'(x) = 3x^2 - 1$, and $f(1) = 5$. What is $f(x)$?

b. Suppose $f'(x) = 3\sin(x) + e^{-x}$ and $f(0) = 0$. What is $f(x)$?

3. [9 points] Evaluate the following limits. **Show your work**, including appropriate use of limit notation. If you use L'Hôpital's rule, you must indicate where you are using it by writing $\stackrel{H}{=}$ or $\stackrel{L'H}{=}$ or something similar. Use ∞ or $-\infty$ where appropriate, and if the limit does not exist, write DNE and provide a justification.

a. $\lim_{x \rightarrow 0} \frac{(1+x)^{1/3} - 1 - \frac{1}{3}x}{x^2}$

b. $\lim_{x \rightarrow \frac{\pi}{4}} (1 - \cos(x)) \csc(x)$

c. $\lim_{x \rightarrow \infty} \left(1 + \frac{3}{x}\right)^x$