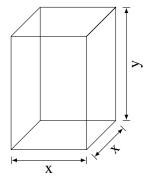
Nov 10, 2022 Math 251: Quiz 9

Name: ______ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [9 points]

An **open-topped** box with a square base will be constructed from material that costs \$10 per square meter for the base of the box and \$1 per square meter for the sides of the box. Determine the dimensions of the least expensive box that has a volume of 40 cubic meters.



- **a**. What is a formula for the cost, C, of the box using x and y as labeled in the picture?
- **b**. Write *C* as a function of **one** variable. You must show your work to receive any credit here.

- **c**. What is a reasonable domain for the function above?
- **d**. In one approach, the function for cost could be $C(x) = 10x^2 + 160x^{-1}$. Use this function to answer the question. You must justify your answer to earn full credit.

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2. [10 points] Evaluate the limits below. If you use L'Hopital's Rule, demonstrate this by identifying the form of the limit and with an *h* over the equal sign.

a.
$$\lim_{\theta \to 0} \frac{2\theta}{\sin(\theta)} =$$

$$\mathbf{b.} \ \lim_{x \to 0^+} x \ln(x) =$$

c.
$$\lim_{x\to 0} \frac{x^3}{1+\cos(x)} =$$

3. [6 points] Evaluate the integrals below and **check** that your answer is correct.

$$\mathbf{a.} \int (5+\sin(x))\,dx =$$

b.
$$\int 4x^{1/3} - \sec^2(x) dx =$$