Name: $\qquad$ / 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 $C(x)=10 x^{2}+160 x^{-1}$. Use this function to answer the question. You must justify your answer to earn full credit.
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. $\lim _{\theta \rightarrow 0} \frac{2 \theta}{\sin (\theta)}=$
b. $\lim _{x \rightarrow 0^{+}} x \ln (x)=$
c. $\lim _{x \rightarrow 0} \frac{x^{3}}{1+\cos (x)}=$
3. [6 points] Evaluate the integrals below and check that your answer is correct.
a. $\int(5+\sin (x)) d x=$
b. $\int 4 x^{1 / 3}-\sec ^{2}(x) d x=$

