

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]** A rectangular solid has constant length of 5 m . Its height is increasing at a rate of 2 m/s and its width is decreasing at a rate of 3 m/s . How fast is the volume of the solid changing when the height is 9 m and the width is 6 m ?

Your final answer should be a sentence and should include units.

2. [8 points] Let $h(x) = x + 3e^{2x}$.

a. Find the differential of $h(x)$.

b. Find the linear approximation of $h(x)$ at $a = 0$.

c. If x changes from $x = 0$ to $x = 0.1$, use the differential to estimate how much you expect $h(x)$ to change. Your answer should be a decimal or simplified fraction.

3. [8 points] Let $f(x) = x^2(3 - 4x)$.

a. Find all critical points for $f(x)$.

b. Determine the absolute maximum and absolute minimum of $f(x)$ on the interval $[-1, 1]$ or state that none exist. You must show your work to receive full credit. See the answer-blank below.

maximum value of $f(x)$: _____

minimum value of $f(x)$: _____