

Your Name: Key

Calculus I, Math 151-06, Quiz #6

1. [8 points] The formula for the surface area A of a sphere in terms of its radius r is $A = 4\pi r^2$. Temi measures the radius of a ball as 5 inches, and he is confident in his measurement within an error of .3 inches. What is the corresponding error in the calculated surface area of the ball? Simplify your answer and include units.

$$A = 4\pi r^2 \quad r = 5 \quad dr = \pm .3$$
$$dA = 8\pi r dr$$
$$dA = 8\pi(5)(\pm .3)$$
$$\boxed{dA = \pm 12\pi \text{ in}^2}$$

2. [7 points] Evaluate the derivative of $y = \cosh(\cos x)$.

$$y' = \sinh(\cos x)(-\sin x)$$

3. [10 points] Find the absolute maximum and minimum values of the function $f(x) = x^3 - 9x^2 + 24x + 9$ on the interval $[-1, 3]$.

$$f'(x) = 3x^2 - 18x + 24 = 0$$

$$x^2 - 6x + 8 = 0$$

$$(x-2)(x-4) = 0$$

$$x=2 \text{ or } x=4$$

↗ Not in domain

$$f(-1) = (-1)^3 - 9(-1)^2 + 24(-1) + 9 = -1 - 9 - 24 + 9 = -25$$

$$f(2) = (2)^3 - 9(2)^2 + 24(2) + 9 = 8 - 36 + 48 + 9 = 29$$

$$f(3) = (3)^3 - 9(3)^2 + 24(3) + 9 = 27 - 81 + 72 + 9 = 27$$

f has an abs. min of -25 (at $x=-1$) and an abs. max of 29 (at $x=2$)