MATH 2250 Calculus
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Name: Solutions
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Quiz No. 2

Show all of your work, label your answers clearly, and do not use a calculator.

Problem 1 (25 points) Using the technique from class (the same one used in Example 3 on p. 54 of the textbook) find the rate of change of the function $f(x) = 3x^2 + 5x$ at the point $x = 2$.

$$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h} = \lim_{h\to 0} \frac{\left(3(x+h)^2+5(x+h)\right)-\left(3x^2+5x\right)}{h}$$

$$= \lim_{h\to 0} \frac{3x^2+6xh+3h^2+5x+5h-3x^2-5x}{h}$$

$$= \lim_{h\to 0} \frac{h(6x+3h+5)}{h}$$

$$= \lim_{h\to 0} \frac{6x+3h+5}{1}$$

$$= 6x+5$$

So $f'(x) = 6x+5$, and $f'(2) = 12+5 = 17$

Problem 2 (25 points) Find the set of x-values that satisfy $|x+7| \geq 10$ and write your answer in interval notation.

$|x+7| \geq 10 \Rightarrow -(x+7) \geq 10$ or $(x+7) \geq 10$

$\Rightarrow -x \geq 17$ or $x \geq 3$

$\Rightarrow x \leq -17$ or $x \geq 3$

$\Rightarrow (-\infty, -17] \cup [3, \infty)$

Problem 3 (25 points) Find all solutions to the equation

$$\log(x+10) = \log(x) + \log(10)$$

$\log(x+10) = \log(10x)$

$x + 10 = 10x$

$10 = 9x$

$x = \frac{10}{9}$

Problem 4 (25 points) Fully simplify the given expressions:

a $\log_3(27^9)$

$\log_3(27^9) = 9\log_3(27) = 9(3) = 27$

b $10^{2\log_{10}(5)}$

$10^{2\log_{10}(5)} = 10^{\log_{10}(5^2)} = 5^2 = 25$