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MATH 111-I
Spring 2025
Quiz 11

Problem 1: Find the average rate of change of $f(x) = 2x^2 + 4x - 5$ on $[-1, 1]$.

The average rate of change of a function on an interval is the slope of the line through the graph of the function at the interval's endpoints, i.e. $\dfrac{\Delta y}{\Delta x} = \dfrac{f(b) - f(a)}{b - a}$*, where the interval is* $[a, b]$*. We have* $a = -1$ *and* $b = 1$*. But then...*

$$f(1) = 2(1^2) + 4(1) - 5 = 2(1) + 4(1) - 5 = 2 + 4 - 5 = 1$$

$$f(-1) = 2(-1)^2 + 4(-1) - 5 = 2(1) + 4(-1) - 5 = 2 - 4 - 5 = -7$$

But then...

$$\textit{Avg. ROC} = \frac{\Delta y}{\Delta x} = \frac{f(1) - f(-1)}{1 - (-1)} = \frac{1 - (-7)}{1 - (-1)} = \frac{1 + 7}{1 + 1} = \frac{8}{2} = 4$$

Problem 2: Write the following functions as $f\big(g(x)\big)$ for some functions $f(x), g(x)$.

(a) $\ln(16 - x^2)$

There are infinitely many answers. For instance,

$$f(x) = \ln x \qquad g(x) = 16 - x^2$$

(b) $8\sqrt{4x + 5}$

There are infinitely many answers. For instance,

$$f(x) = 8\sqrt{x} \qquad g(x) = 4x + 5$$

(c) $\dfrac{1}{x^2 + x + 5}$

There are infinitely many answers. For instance,

$$f(x) = \frac{1}{x} \qquad g(x) = x^2 + x + 5$$