#1. [3 pts] Write down a limit that represents the slope of the tangent line to the graph of $y = 2x^2 - x + 3$ at $x = -2$.

For notational convenience, let $f(x) = 2x^2 - x + 3$. Either of the following expressions is correct (as are various algebraic variations):

$$\lim_{x \to -2} \frac{f(x) - f(-2)}{x + 2} \qquad \text{or} \qquad \lim_{h \to 0} \frac{f(-2 + h) - f(-2)}{h}.$$

Or you could replace $f(x)$ with its formula and notice that $f(-2) = 13$, to get

$$\lim_{x \to -2} \frac{2x^2 - x - 10}{x + 2}.$$

A very common mistake was to give the answer as $\lim_{x \to -2} 2x^2 - x - 10$. That tells you what value *the function itself* approaches as x gets close to -2, but that is not the same thing as the *slope of the tangent line.*

#2. [2 pts] Evaluate this limit.

I'll evaluate the first expression above:

$$\begin{aligned} \lim_{x \to -2} \frac{2x^2 - x - 10}{x + 2} &= \lim_{x \to -2} \frac{(2x - 5)(x + 2)}{x + 2} \\ &= \lim_{x \to -2} 2x - 5 \\ &= 2(-2) - 5 = \boxed{-9.} \end{aligned}$$

Note: Yes, if you know what a derivative is (and most of you do) then you could get this answer much more quickly, but the point of the problem was to be able to find the tangent line slope directly from the definition, without using any shortcuts.