Practice Problems — 01/24/05

(1) Find the slope of the tangent line to $f(x) = x^2$ at the point $(3, 9)$.

(2) What is the equation of the tangent line passing through $(1, 5)$ on the graph $f(x) = x^3 + x + 3$.

(3) What does the limit $\lim_{h \to 0} \dfrac{\dfrac{1}{x+h} - \dfrac{1}{x}}{h}$ represent? Evaluate.

(4) A car is driving in a straight line away from home, and its distance in feet is given as a function of time (measured in seconds): $f(s) = \frac{1}{4}s^2 + 20s$. What is the car's speed at $s = 60$ seconds?

(5) What does the limit $\lim_{h \to 0} \dfrac{\sin(x+h) - \sin(x)}{h}$ represent? Do not evaluate.

(6) It is a fact that e is a number which satisfies the condition $\lim_{h \to 0} \dfrac{e^h - 1}{h} = 1$. Use this fact to find the slope of the tangent line to $f(x) = e^x$ at the point $(1, e)$. What is the equation of the tangent line at this point?