1. Find the average rate of change of \( g(x) = x^2 + x \) over the interval \([-1, 1]\).

   \[ \text{Ans. } 1 \]

2. Find the limit or write “d.n.e.” if the limit does not exist.

   (a) \( \lim_{t \to -2} \frac{x^2}{x^2 + 5x + 6} \)

   \[ \text{Ans. } 1 \]

   (b) \( \lim_{h \to 2} \frac{\sqrt{h^2 + 5} - 3}{h - 2} \)

   \[ \text{Ans. } 4 \]

3. \( y = x^2 - 1, \frac{dy}{dx} = 2x \). Find the equation for the tangent to the curve at the point \((2, 3)\). Write equation in the form \( y = ax + b \).

   \[ \text{Ans. } y = 4x - 5 \]

4. At time \( t \) seconds after takeoff, the height of a rocket is \( h(t) = t^2 - t \) ft. with derivative \( h'(t) = 2t - 1 \). How fast is the rocket climbing 10 seconds after takeoff? Include the units.

   \[ \text{Ans. } 19 \text{ ft/sec} \]

5. Find the limit. If it does not exist, write either \( \infty \) or \(-\infty\), do not write “d.n.e.”.

   (a) \( \lim_{h \to 0} \frac{\sin(-h)}{6h} \)

   \[ \text{Ans. } -\frac{1}{6} \]

   (b) \( \lim_{x \to \infty} \frac{\sqrt{3x + 1}}{\sqrt{x + 3}} \)

   \[ \text{Ans. } \sqrt{3} \]

   (c) \( \lim_{x \to -3} \frac{1}{9 - x^2} \)

   \[ \text{Ans. } -\infty \]

6. Use the pinching (sandwich) theorem to prove: \( \lim_{\theta \to \infty} \frac{\sin \theta}{\theta} = 0 \)

7. \( f(x) = x^2 + 5 \). Prove that \( f'(x) = 2x \) using the definition of the derivative. No credit for using the basic rules.

\[ \text{Complete both pages, both sides} \]