

Limits & Derivatives Worksheet
Math 1100-005
01/26/06

1. Find the limit (if it exists):

(a) $\lim_{t \rightarrow 3} \frac{t^2+1}{t}$

(b) $\lim_{x \rightarrow \frac{1}{2}} \frac{2x-1}{6x-3}$

(c) $\lim_{x \rightarrow 0} \frac{\frac{1}{x-2}-1}{x}$

2. Describe the intervals on which the function is continuous:

(a) $f(x) = \frac{x+1}{2x+2}$

(b) $f(x) = \frac{1}{x^2+x-2}$

3. Find the slope of the tangent line at the given point:

(a) $f(x) = (x - 1)^2$ at $(-2, 9)$

4. Find the derivative using the definition of a derivative:

(a) $f(x) = x^2 + 3$

(b) $f(x) = 2x + 5$

5. Find the derivative:

(a) $f(x) = 3x^2 - x + \frac{1}{x}$

(b) $f(x) = x^{\frac{1}{2}} + x^3 - 6$

(c) $f(x) = \frac{2}{x^{\frac{3}{5}}}$

(d) $f(x) = (x + 1)(x^3 - 2x - 1)$

(e) $f(x) = \sqrt{x}(x^2 - x)$

(f) $f(x) = \frac{4x+2}{x-1}$

(g) $f(x) = \frac{4x^2 - 3x}{x^{\frac{2}{3}} - x}$

6. The height h (feet) at time t (seconds) of a ball dropped off a building is given by:

$$h(t) = -16t^2 + 150$$

- (a) Find the average velocity on the interval $[1,2]$.

- (b) Find the instantaneous velocities when $t=1$ & $t=2$.

7. The revenue (in dollars) of selling x units of calculators is given by:

$$R(x) = 50x - 0.5x^2$$

- (a) Find the additional revenue when sales increase from 9 to 10.

- (b) Find the marginal revenue when $x=10$.