

1. Find the following limits if they exist:

(a)  $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1}$

(b)  $\lim_{x \rightarrow \infty} \frac{x^2 - 1}{x^3 + 1}$

2. Find the compound amount of an investment of \$4000 for five years at the rate of 10% compounded semiannually. (Give the equation; you do not need to estimate)

3. A dept of \$1000 due in five years is to be repaid by a single payment now. Find how much the payment is if an interest rate of 8% compounded quarterly is assumed. (Give the equation)

4. a)  $\lim_{x \rightarrow -\infty} \frac{3 - 2x - 7x^3}{7 + 2x^2 - 5x^3}$

b)  $\lim_{r \rightarrow \infty} \frac{3r^3}{r^2 + 1}$

c)  $\lim_{t \rightarrow \infty} (t - 1)^3$

d)  $\lim_{x \rightarrow -\infty} \frac{2}{(4x - 1)^3}$

e)  $\lim_{t \rightarrow 2} \frac{t^2 - 4}{t + 2}$

f)  $\lim_{t \rightarrow -2} \frac{t^2 - 4}{t + 2}$

g)  $\lim_{x \rightarrow -2} \frac{5x}{4 - x^2}$

h)  $\lim_{x \rightarrow 0^+} \frac{5}{x + x^2}$

5. If 1000 is invested at an annual rate of 3% compounded continuously, find the compound amount at the end of eight years. (Give the equation)

6. Find all points of discontinuity for the function  $f(x) = \frac{x - 7}{x^3 - x}$

7. Find the slope of  $y = 5 - 6x - 2x^3$  when  $x = 2$ .

8. Find the equation of the tangent line to the curve  $y = \frac{2x + 3}{x^2}$  at the point  $(1, 5)$

9. a)  $y = \frac{2x^2 + 1}{2}$

$y' = ?$

b)  $\frac{d}{dx} \frac{-3}{(3x^2 + 1)^3} = ?$

c)  $y = \left( \frac{8x - 1}{2x + 1} \right)^3$

$y' = ?$

d)  $\frac{d}{dx} (5x^2 + 2 - \sqrt{x + 4}) = ?$

$y = 100x^{-3} + 10\sqrt[3]{2x}$

$y' = ?$

f)  $\frac{d}{dx} \left( \frac{5x^4 - 7x^2}{2x + 5} \right)$

$\frac{dc}{dp}$

- 1) Due to ineffective advertising Istek Vakfi finds that its annual revenues have been cut sharply. Moreover, the revenue,  $r$ , at the end of  $t$  years of the business satisfies the equation  $r = 200,000e^{-0.2t}$ . Find the annual revenue ( $r$ ) at the end of two years and at the end of three years.
- 2) Suppose attending to a certain college cost \$21,500 in the 2000-2001 school year. This price includes tuition, room, board, books and other expenses. Assuming the effective 6% inflation, determine what the college costs will be in the 2010-2011 school year. (Give the equation)
- 3) Find the compound amount of an investment of \$4000 for five years at the rate of 10% compounded semiannually. (Give the equation; you do not need to estimate)
- 4) A dept of \$1000 due in five years is to be repaid by a single payment now. Find how much the payment is if an interest rate of 8% compounded quarterly is assumed. (Give the equation)
- 5) Find the effective rate of interest if a nominal rate of 8% compounded
  - a) annually.
  - b) quarterly.
  - c) continuously
- 6) If 1000 is invested at an annual rate of 3% compounded continuously, find the compound amount at the end of eight years. (Give the equation)

7) Find the following limits if they exist:

$$\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 - 1} \qquad \text{(b)} \qquad \lim_{x \rightarrow \infty} \frac{x^2 - 1}{x^3 + 1}$$

$$8. \text{ a) } \lim_{x \rightarrow -\infty} \frac{3 - 2x - 7x^3}{7 + 2x^2 - 5x^3} \qquad \text{b) } \lim_{r \rightarrow \infty} \frac{3r^3}{r^2 + 1} \qquad \text{c) } \lim_{t \rightarrow \infty} (t - 1)^3 \qquad \text{d) } \lim_{x \rightarrow -\infty} \frac{2}{(4x - 1)^3}$$

$$\text{e) } \lim_{t \rightarrow 2} \frac{t^2 - 4}{t + 2} \qquad \text{f) } \lim_{t \rightarrow -2} \frac{t^2 - 4}{t + 2} \qquad \text{g) } \lim_{x \rightarrow -2^+} \frac{5x}{4 - x^2} \qquad \text{h) } \lim_{x \rightarrow 0^-} \frac{5}{x + x^2}$$

9) Compute the following limits

$$\text{a) } \lim_{x \rightarrow 3} \frac{5x^2 - 8x - 13}{x^2 - 5} \qquad \text{b) } \lim_{x \rightarrow 0} \frac{x^3 - 7x}{x^3} \qquad \text{c) } \lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$$

$$\text{d) } \lim_{x \rightarrow \infty} \frac{100}{x^2 + 5} \qquad \text{e) } \lim_{x \rightarrow -\infty} \frac{x + 7}{3x + 5}$$

10) Consider the function

$$f(x) = \begin{cases} \frac{1}{x^2}, & \text{if } x < -1 \\ 2, & \text{if } -1 \leq x < 1 \\ 3, & \text{if } x = 1 \\ x + 1, & \text{if } 1 < x \leq 2 \\ -1, & \text{if } x > 2. \end{cases}$$

$$\text{a.) } \lim_{x \rightarrow -1^+} f(x) \qquad \text{b.) } \lim_{x \rightarrow -1^-} f(x) \qquad \text{c.) } \lim_{x \rightarrow -1} f(x)$$

$$\text{d.) } \lim_{x \rightarrow 1^+} f(x) \qquad \text{e.) } \lim_{x \rightarrow 1^-} f(x) \qquad \text{f.) } \lim_{x \rightarrow 1} f(x)$$

11) Find all points of discontinuity for the function  $f(x) = \frac{x - 7}{x^3 - x}$

Find the points where  $f$  is discontinues a)  $f(x) = \begin{cases} 2^{x-1} & \text{if } x > 1 \\ 2^x - 1 & \text{if } x \leq 1 \end{cases}$  . b)  $f(x) = \begin{cases} e^{x-1} & \text{if } x > 1 \\ e^x - 1 & \text{if } x \leq 1 \end{cases}$