

Name _____

Test 1

MATH 1425

Business Calculus 1

Fall 2010

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Tools: any calculator
Deadline: 10/7/2010

(5 points)

1. Use the graph of the function f to find the indicated limits.

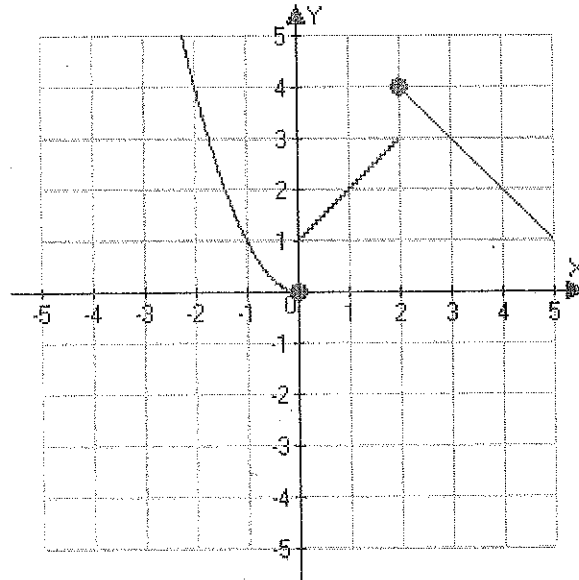
a) $\lim_{x \rightarrow 0} f(x)$

b) $\lim_{x \rightarrow 1} f(x)$

c) $\lim_{x \rightarrow 2^-} f(x)$

d) $\lim_{x \rightarrow 2^+} f(x)$

e) $\lim_{x \rightarrow 2} f(x)$



(6 points)

2. Find the following limits for the function $f(x) = \frac{|x-2|}{x-2}$

a) $\lim_{x \rightarrow 0} f(x)$

b) $\lim_{x \rightarrow 2^-} f(x)$

c) $\lim_{x \rightarrow 2^+} f(x)$

(4 points)

3. Let $f(x) = \begin{cases} 1 - x^2 & \text{if } x \leq 0 \\ 1 + x^2 & \text{if } x > 0 \end{cases}$. Find the indicated quantities:

a) $\lim_{x \rightarrow 0^+} f(x)$

b) $\lim_{x \rightarrow 0^-} f(x)$

c) $\lim_{x \rightarrow 0} f(x)$

d) $f(0)$

(4 points)

4. Find the following limit: $\lim_{x \rightarrow 2} \frac{x - 2}{x^2 + x - 6}$

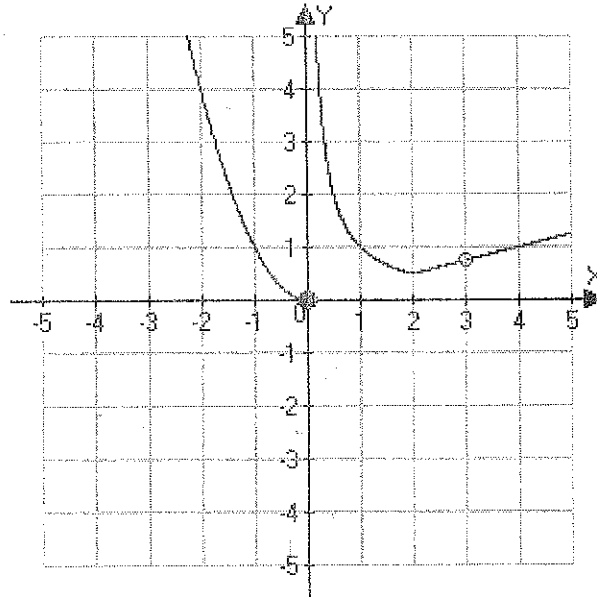
(4 points)

5. A company training program determines that, on average, a new employee can do $P(s)$ pieces of work per day after s days of on-the-job training, where

$P(s) = \frac{100 + 50s}{s + 5}$. Find *and interpret* $\lim_{s \rightarrow 5} P(s)$.

(5 points)

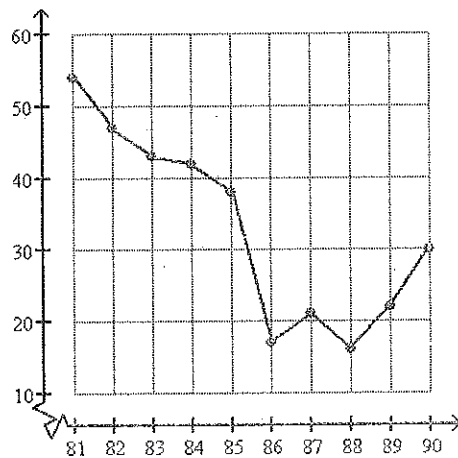
6. Discuss the continuity of the function f whose graph is given below.



(4 points)

7. The graph shows the average cost of a barrel of crude oil for the years 1981 to 1990 in constant 1996 dollars. Find the approximate average change in price from 1981 to 1990.

1996 \$/Barrel



(5 points)

8. Use the four step process (or the definition) to find the derivative of the function

$$f(x) = 2x^2 - 3x .$$

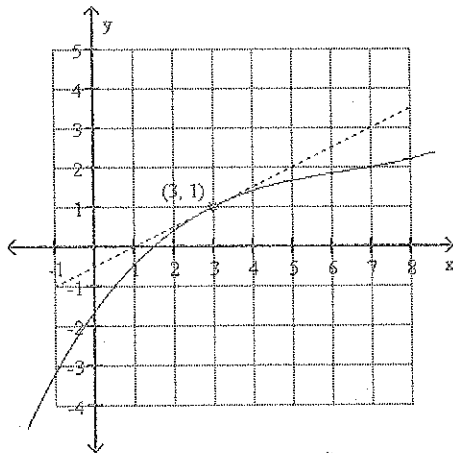
(5 points)

9. Use the four step process (or the definition) to find the derivative of the function

$$f(x) = \frac{2}{x} .$$

(3 points)

10. Estimate the slope of the tangent line to the curve at the given point.



(5 points)

11. Suppose the demand for a certain item is given by $D(p) = -4p^2 + 8p + 7$, where p represents the price of the item. Find $D'(p)$, the rate of change of demand with respect to price. Find $D'(2)$.

(12 points)

12. Find the derivative of each function.

a) $f(x) = 3x^5 + 2x$

b) $f(x) = \frac{1}{\sqrt{x}}$

c) $f(x) = 5x^{1/2} + 3x^{-5/3} + 2$

(6 points)

13. A contagious disease affects a certain town. The number of persons infected with the disease t days after the start of the spread of the disease is given by the function $f(t) = 1 + 63\sqrt{t}$. Find and interpret $f'(4)$.

(8 points)

14. Find the derivative of each function but do not simplify.

a) $g(x) = (2x^4 + 3x^2 - 5)(x^3 + x + 5)$

b) $g(x) = \frac{3x^2 - 5}{x^2 + x + 5}$

(8 points)

15. Find the derivative of each function.

c) $f(x) = (2x^4 + 3x^2 - 5)^5$

d) $f(x) = \left(\frac{1+x}{x-1}\right)^2$

(6 points)

16. Suppose the total cost (in hundreds of dollars) for producing x cell phones is given by $C(x) = 10 + \sqrt{2x + 16}$, $0 \leq x \leq 50$.

a. Find $C'(x)$.

b. Find $C'(24)$ and interpret the result

(5 points)

17. Write an equation of the tangent line to the graph of $f(x) = x^2 + 4$ at the point (1,5).

(5 points)

18. The number of cows that can graze on a ranch is approximated by

$$C(x,y) = 9x + 5y - 4,$$

where x is the number of acres of grass and y the number of acres of alfalfa. If the ranch has 75 acres of alfalfa and 50 acres of grass, how many cows may graze?