Math 150   Name:_____
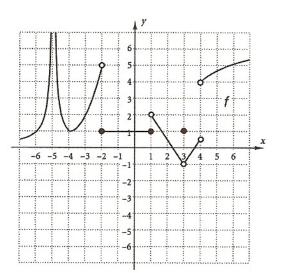Ms. Meier
Review Chapter 1

1) Use the above graph to find each limit, if it exists:

   a) $\lim\limits_{x \to -5} f(x)$

   b) $\lim\limits_{x \to -2} f(x)$

   c) $\lim\limits_{x \to 0} f(x)$

   d) $\lim\limits_{x \to 3} f(x)$

   e) $\lim\limits_{x \to 4} f(x)$

   f) $\lim\limits_{x \to -4} f(x)$

2) Find each limit algebraically, if it exists:

   a) $\lim\limits_{x \to -4} (5x - x^2 - 2x^3)$

   b) $\lim\limits_{x \to 5} \dfrac{x - 5}{x^2 - x - 20}$

   c) $\lim\limits_{h \to 0} (3x^2 + 2xh + 3h^2)$

   d) $\lim\limits_{x \to -1} \dfrac{x + 1}{x^3 + 1}$

3) Suppose the Sports Stylz Inc. determines that the revenue, in dollars, from the sale of x cell phone sunglasses is given by: $R(x) = -0.01x^2 + 1000x$ Find the average rate of change from x = 10 to x = 15 and interpret.

4) Graph: $f(x) = \begin{cases} x + 3 & \text{for } x \geq 1 \\ x^2 + 4 & \text{for } x < 1 \end{cases}$ is f(x) continuous?

5) Find dy/dx

a) $y = -\dfrac{2}{3}x^3 + 16x^2 + 4x + 11$

b) $y = \dfrac{2x-1}{x^4}$

c) $y = (6x^2 - 10x + 1)^{-4}$

d) $y = 5\sqrt[3]{x} + 6\sqrt{x}$

e) $y = (x+5)^5(4-x)^2$

f) $y = x^{\frac{4}{5}} + \dfrac{4}{x^3} - \dfrac{1}{\sqrt{x}}$

6) Find an equation of the tangent line to the graph of $y = 2x + \dfrac{3}{x}$ at $x = 1$

7) A biologist models the effects of introducing a certain toxin to a bacterial colony by the function $P(t) = \dfrac{t+1}{t^2 + t + 4}$ where P is the population of the colony, in millions, t hours after the toxin is introduced.

a) At what rate is the population changing when the toxin is introduced? (t = 0)

b) At what rate is the population changing 1 hour after the toxin has been introduced?

8) Find the points on the graph of $f(x) = x^3 - 2x^2$ at which the tangent line is horizontal.

9) The number of cases of tuberculosis reported in the U.S. can be modeled by $f(x) = -0.014x^3 + 0.39x^2 - 3.11x + 30.29$ where x is the years since 1979 and f(x) is the number of cases of tuberculosis in thousands.

Find $f'(10)$ and interpret

Answers:

1. a) ∞ b) does not exist   c) 1   d) -1   e) does not exist   f) 1

2. a) 92   b) 1/9   c) $3x^2$ d) 1/3

3. The average rate of change = 999.75, when selling from 10 to 15 cell phone sunglasses the revenue is increasing on average \$999.75/cell phone sunglass

4. Graph, f(x) is discontinuous at x = 1

5. a) $dy/dx = -2x^2 + 32x + 4$ b) $dy/dx = \dfrac{-2(3x-2)}{x^5}$ c) $dy/dx = \dfrac{-8(6x-5)}{(6x^2-10x+1)^5}$

  d) $dy/dx = \dfrac{5}{3\sqrt[3]{x^2}} + \dfrac{3}{\sqrt{x}}$ e) $dy/dx = (x+5)^4(4-x)(10-7x)$ f) $dy/dx = \dfrac{4}{5\sqrt[5]{x}} - \dfrac{12}{x^4} + \dfrac{1}{2\sqrt{x^3}}$

6. y = - x + 6

7. a) the bacteria population is growing at a rate of 0.1875 million/hour b) after 1 hour of the toxin being introduced, the bacteria population is not growing (derivative =0)

8. (0,0) and (4/3, -32/27)

9. In 1989 the number of cases of TB is increasing at a rate of 490/year (or .49 tousand/year)