1) Complete the table below, then use it to approximate
$\lim\limits_{x \to -1} f(x)$, where $f(x) = \dfrac{2x^3 + 3x^2 - 4x - 5}{x+1}$.

x	-1.1	-1.01	-1.001	-0.999	-0.99	-0.9
$f(x)$						

2) Find the limit values if they exist.

a) $\lim\limits_{x \to 3} \left(\dfrac{x^2 + 2x - 15}{x^2 + x - 12} \right)$

b) $\lim\limits_{z \to 0} \left(\dfrac{\dfrac{-1}{z+2} + \dfrac{1}{2}}{z} \right)$

c) $\lim\limits_{x \to 16} \left(\dfrac{\sqrt{x} - 4}{x - 16} \right)$

d) $\lim\limits_{x \to \infty} \left(\dfrac{2x^3 - 5x^2 + 9x}{3x^3 - 4x} \right)$

e) $\lim\limits_{x \to -\infty} \left(\dfrac{2x^2 - 5}{3x^3 + 2x} \right)$

3)   Find the average rate of change for each function over the given interval.

   a) $y = -4x^2 - 6$ [2,6]   b) $y = \sqrt{3x - 2}$ [1,6]

4)   Suppose the position of an object moving in a straight line is given by $s(t) = t^2 + 5t + 2$.
     Find the instantaneous velocity when $t = 5$.

5)   Suppose the total profit in hundreds of dollars from selling x items is given by
     $P(x) = 2x^2 - 4x + 5$.   (a) Find the average rate of change of profit for the changes for 2 to 5
     items. (b) Find the instantaneous rate of change of profit when $x = 2$.

6)   For what x values would the function graphed below not have derivatives.
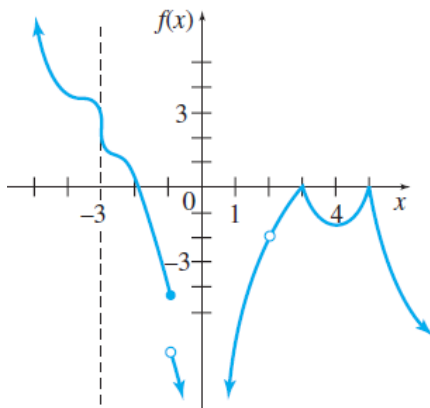
7) The revenue in dollars generated from the sale of x items is given by $R(x) = 10x - \dfrac{x^2}{100}$.

(a) Find the marginal revenue when 500 items have been sold. (b) Estimate the revenue from the sale of the 601st item by finding $R'(600)$.

Find the derivative of each. (8 – 13)

8) $y = 3x^5 - 6x^3 + \dfrac{1}{2}x^2 - 2x$

9) $f(x) = 10x^{-4} - \dfrac{7}{x^3} + 3x$

10) $g(x) = (2x^2 - 5)^2$

11) $y = (3x^2 + 1)(2x^2 - 4x + 3)$

12) $q(x) = \dfrac{x^2 + 7x - 2}{x^2 - 2}$

13) $r(x) = \sqrt{5x^3 - 4x^2}$

14) Find $f'(2)$ if $f(x) = x^4 - \dfrac{4}{3}x^3 + 2x^2 - 5x + 8$.

15) Find all points on the graph of $g(x) = x^3 + 9x^2 + 19x - 10$ where the slope of the tangent line is -5.

6) Find an equation of the line tangent to the graph of $f(x) = \dfrac{x}{x-2}$ at the point (3,3).

17) Assume that the total number (in millions) of bacteria present in a culture at t hours is given by $N(t) = 4t^2(t-20)^2 + 20$. Find the rate at which the population of bacteria is changing at 5 hours and at 8 hours.