AP CALCULUS BC Summer Assignment

This packet is a review of some Calculus topics. It is to be done NEATLY and on a SEPARATE sheet of paper. Use your discretion as to whether you should use a calculator or not. The assignment is due the first Friday that we meet in September.

For #1-4 below, find the limits, if they exist. (1 point each)

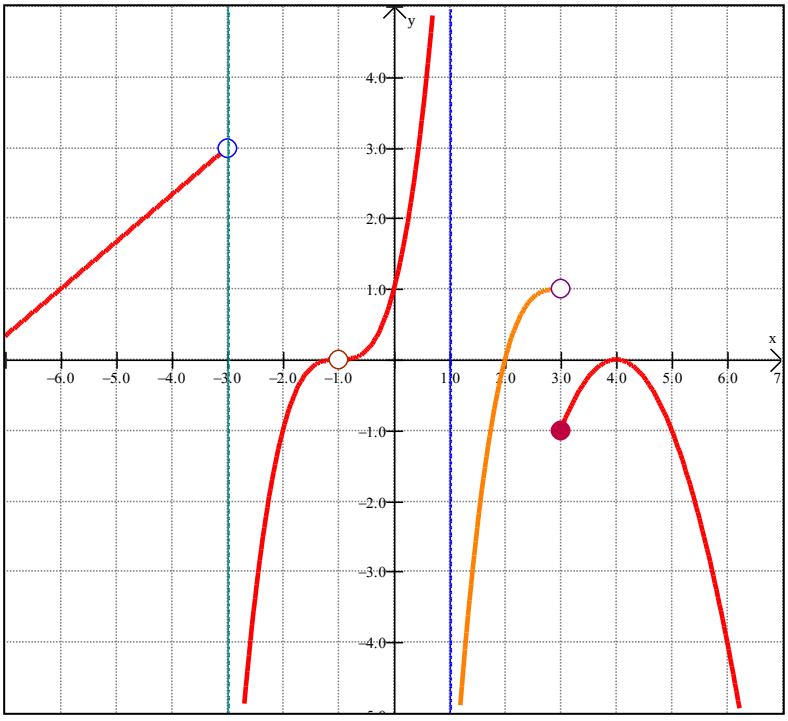
1) $\lim\limits_{x\to 4} \dfrac{2x^3-7x^2-4x}{x-4}$

2) $\lim\limits_{x\to 9} \dfrac{\sqrt{x}-3}{9-x}$

3) $\lim\limits_{x\to 1} \dfrac{x^2-2x-5}{x+1}$

4) $\lim\limits_{x\to -2} \dfrac{x^3+8}{x+2}$

For #5-10, determine if the following limits exist, based on the graph below of p(x). If the limits exist, state their value. Note that x = -3 and x = 1 are vertical asymptotes.



5) $\lim\limits_{x\to 1^-} p(x)$

6) $\lim\limits_{x\to -3^-} p(x)$

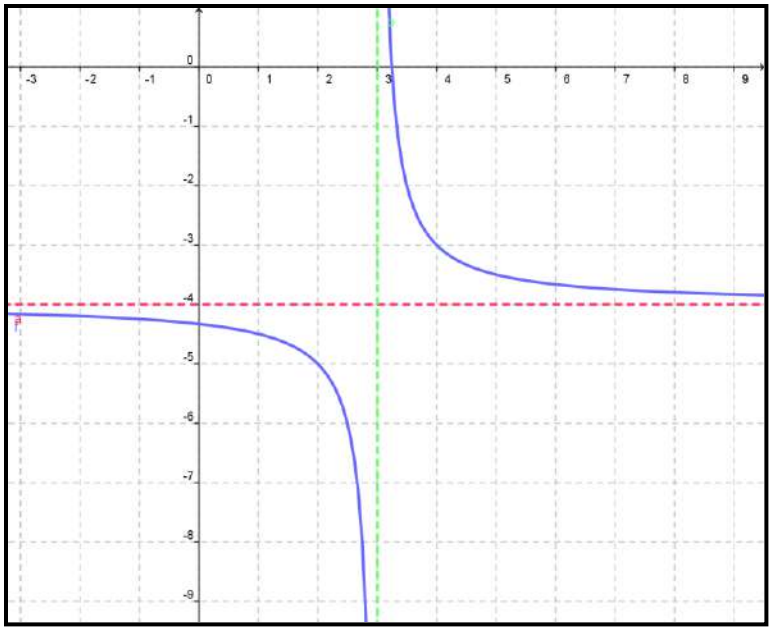
7) $\lim\limits_{x\to 2} p(x)$

8) $\lim\limits_{x\to 3^-} p(x)$

9) $\lim\limits_{x\to 3^+} p(x)$

10) $\lim\limits_{x\to -1} p(x)$

Use the graph of f(x), shown below, to answer #11-13.



11) For what value of *a* is $\lim_{x \to a} f(x)$ nonexistent?

12) $\lim_{x \to \infty} f(x) =$_____

13) $\lim_{x \to -\infty} f(x) =$ _____

For #14-20, find the derivative.

14) $y = \ln(1 + e^x)$

15) $y = \csc(1 + \sqrt{x})$

16) $y = (\tan^2 x)(3\pi x - e^{2x})$

17) $y = \sqrt[7]{x^3 - 4x^2}$

18) $f(x) = (x+1)e^{3x}$

19) $f(x) = \dfrac{e^{x/2}}{\sqrt{x}}$

20) If $xy^2 - y^3 = x^2 - 5$, then $\dfrac{dy}{dx} =$

Use the table below for #21-22.

x	$f(x)$	$g(x)$	$f'(x)$	$g(x)$
1	4	2	5	½
3	7	-4	$\frac{3}{2}$	-1

21) The value of $\frac{d}{dx}(f \cdot g)$ at x = 3 is

22) The value of $\frac{d}{dx}\left(\frac{f}{g}\right)$ at x = 1

In #23-24, use the table below to find the value of the first derivative of the given functions for the given value of x.

x	$f(x)$	$g(x)$	$f'(x)$	$g(x)$
1	3	2	0	¾
2	7	-4	$\frac{1}{3}$	-1

23) $[f(x)]^2$ at x = 2 is

24) $f(g(x))$ at x = 1 is

For #25-26, find all critical values, intervals of increasing and decreasing, any local extrema, points of inflection, and all intervals where the graph is concave up and concave down.

25) $y = 3x^2+2x-1$

26) $f(\mathrm{x}) = 5x^3 - 15\mathrm{x} + 7$

Evaluate the following.

27) $\int_{-8}^{-1} \frac{x - x^2}{2\sqrt[3]{x}}\,dx$

28) $\int_{-\pi/6}^{\pi/6} \sec^2 x\,dx$

29) $\frac{d}{dx}\int_{1}^{x} \sqrt[4]{t}\,dt$

30) $\frac{d}{dx}\int_{\sin(4x)}^{0} e^t\,dt$

31) $\int \frac{x^3}{\sqrt{1+x^4}}\,dx$

32) What is the average value of $y = x^3\sqrt{2+x^4}$ on the interval [0, 2]?

33) The table below provides data points for the continuous function $y = h(x)$.

x	0	2	4	6	8	10
$h(x)$	9	25	30	16	25	32

Use a right Riemann sum with 5 subdivisions to approximate the area under the curve of $y = h(x)$ on the interval [0, 10].

34) Let R be the region in the first quadrant under the graph of $y = \frac{1}{\sqrt{x}}$ for $4 \le x \le 9$.

(a) Find the area of R.

(b) If the line x = k divides the region R into two regions of equal area, what is the value of k?

(c) Find the volume of the solid generated by revolving R about the *x*-axis.