Name_____AP Calc BC Summer Packet

Please do all work on another piece of paper and put all answers here.

1.	17.	33.
2.	18.	34.
3.	19.	35.
4.	20.	36.
5.	21.	37.
6.	22.	38.
7.	23.	39.
8.	24.	40.
9.	25.	41.
10	26.	42.
11.	27.	43.
12.	28.	44.
13.	29.	45.
14.	30.	46.
15.	31.	47.
16.	32.	

Open Ended

1. $\lim_{x\to 2} \frac{x^2-4}{x^2+4}$

2. $\lim_{x\to -\infty} \frac{5x^3+27}{20x^2+10x+9}$

3. $\lim_{x\to 0} \frac{\ln(2+h)-ln2}{h}$

For 4 - 11 find the derivative

4. $y = x^5 Tanx$

5. $y = \frac{2-x}{3x+1}$

6. $y = \sqrt{3-2x}$

7. $y = \frac{2}{(5x+1)^3}$

8. $y = ln\left(\sqrt{x^2+1}\right)$

9. $y = Sin\left(\frac{1}{x}\right)$

10. $y = Tan^{-1}\frac{x}{2}$

11. $y = e^{-x}Cos2x$

For 12 – 15. find dy/dx

12. $x^3 - y^3 = 1$

13. $x + Cos(x + y) = 0$

14. $Sinx - Cosy - 2 = 0$

15. $3x^2 - 2xy + 5y^2 = 1$

16. Write the equation of the tangent to the curve $x^2 + y^2 + 19 = 2x + 12y$ at (4, 3).

17. Write the equation of the normal to the curve $x^2 + y^2 + 19 = 2x + 12y$ at (4, 3).

18. Find the average rate of change for $y = 3x^4 - 2x + 1$ for the interval [1,3].

19. Find the instantaneous rate of change for $y = 3x^4 - 2x + 1$ at $x = 2$.

20. If $f(x) = x^3 - x^2 - 2x$, show that the hypotheses of Rolle's Theorem are satisfied on the interval [-1, 2] and find all values of *c* that satisfy the conclusion of the theorem.

21. Let $f(x) = e^x$. Show that the hypotheses of the Mean Value Theorem are satisfied on [0, 1], and find all the values of *c* that satisfy the conclusion of the theorem.

For questions 22 - 33 use the graph $y = x^3 - 5x^2$.

22. Is there any symmetry?

23. What are the x-intercepts?

24. What are the y-intercepts?

25. What is the first derivative?

26. What are the critical values?

27. What is the minimum point(s)?

28. What is the maximum point(s)?

29. What is the second derivative?

30. What are the critical values?

31. What is the point of inflection(s)?

32. Where is it concave down?

33. Where is it concave up?

34. If one leg AB of a right triangle increases at the rate of 2 inches per second, while the other leg AC decreases at the rate of 3 inches per second, find how fast the hypotenuse is changing when AB = 6 ft and AC = 8 ft.

35. A circular conical reservoir, vertex down, has a depth of 20 ft and radius of the top 10ft. Water is leaking out so that the surface is falling at the rate of .5ft/hr. Find the rate of the water leaving the reservoir when the water is 8 ft deep.

36. Find the area of the largest rectangle that can be drawn with one side along the x-axis and two vertices on the curve of $y = e^{-x^2}$.

37. $\int 3x^2 - 2x + 3\, dx$

38. $\int \sqrt{4 - 2t}\, dt$

39. $\int (2 - 3x)^5 dx$

40. $\int \frac{2x+1}{2x} dx$

41. $\int \frac{dx}{1+4x^2}$

42. $\int \frac{2du}{1+3u}$

43. $\int_{-1}^{0} \sqrt{3u + 4} du$

44. Find the area between $y = x^2 - 3$ and the line $y = 1$

45. Find the volume between $y = x^2$, $x = 2$ and $y = 0$ about the x-axis

46. Find the velocity equation if $a(t) = 4t - 1$ and $v(1) = 3$.

47. If $\frac{dy}{dx} = \frac{x^2}{y}$ and $y = 1$ when $x = 4$, find $f(x) = y$

Open Ended

The graph of the function y = f(x) passes through (2, 5) and satisfies the differential equation $\frac{dy}{dx} = \frac{6x^2 - 4}{y}$

a. Write an equation of the line tangent to f at (2, 5)
b. Using this tangent line, estimate f(2.1)
c. Solve the differential equation, expressing f as a function of x.
d. Use your answer to part (c), find (2.1)