Name:____________________

AP Calculus AB Summer Assignment

These are problems from the textbook:

Section 1.2: # 1, 7, 11, 15, 17-21, 23, 25

Section 1.3: #1-7, 13, 22, 24, 27, 31, 37, 39, 41, 42, 44, 46, 48-51, 53-55, 57, 59, 63-66, 101

Section 1.4: #1-9, 13, 17-19, 27, 28, 31-33, 35-39, 41, 43, 46

Use your book as a resource for each of these sections. There are very good examples for most types of problems. Also use Chapter P as a resource for the pages not from the book. It has a pretty good summary of pre-calculus topics that will be useful. There are AWESOME identities, formulas, and reminders of algebra rules in the front and back cover of your book. Do NOT tear these out, but use them!

AP Calculus AB Summer Assignment

1. $g(x) = x^2 + 3x - 4$. Simplify your answers.

   a. g(2)=

   b. g(t)=

   c. g(x+2)=

2. $f(x) = \begin{cases} 2x^2 - 1, & x < 1 \\ x + 4, & x \geq 1 \end{cases}$

   a. f(0)=

   b. f(1)=

   c. f(2)=

3. $f(x) = 2x + 1$ and $g(x) = x - 3$

   a. (f+g)(x)=

   b. (f-g)(x)=

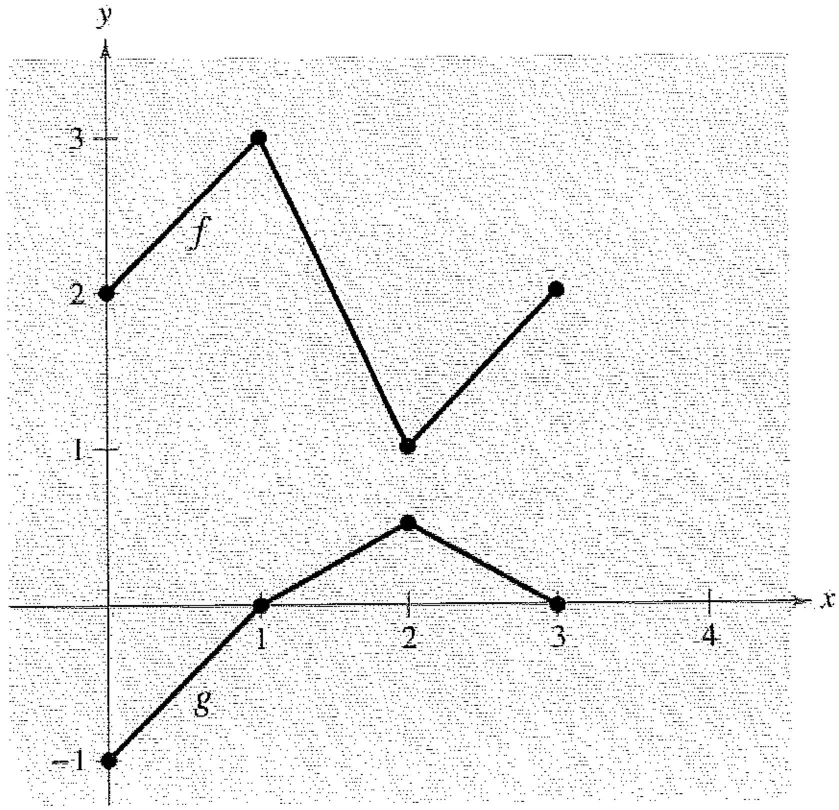
   c. (fg)(x)=

   d. (f/g)(x)=

   e. (f∘g)(x)

   f. (g∘f)(x)=

4. Use the graphs of f and g to graph h(x)=(f+g)(x)



5. $f(x) = 2x + 1$. Simplify your answers.

a. f(x+h)=

b. f(x-1)-f(2)=

c. f(x+h)-f(x)=

Simplify each of the following.

6. $\frac{3(x-4)+2(x+5)}{6(x-4)}$

7. $\frac{1}{x-y} - \frac{1}{y-x}$

8. $\frac{y}{1-\frac{1}{y}}$

9. $x^2\left[\frac{1}{2}(1-x^2)^{-1/2}(-2x)\right] + (1-x^2)^{1/2}(2x)$

10. $\frac{(x+1)^3(x-2)+3(x+1)^2}{(x+1)^4}$

Rationalize the denominator/numerator.

11. $\frac{3\sqrt{2}+\sqrt{5}}{2\sqrt{10}}$

12. $\frac{x}{\sqrt{x+3}-\sqrt{3}}$

13. $\frac{\sqrt{x+1}+1}{x}$

Factor the following.

14. $2x^2 + x - 15$

15. $x^3 - 2x^2 + 9x - 18$

16. $p^3 + 8$

17. $8x^3 - 27$

18. $49a^2 - 144b^2$

19. $15x^{\frac{5}{2}} - 2x^{\frac{3}{2}} - 24x^{\frac{1}{2}}$

Write the following as the sum of two squares. (Complete the square)

20. $x^2 - 4x + 7 =$

21. $2x^2 - 8x + 10 =$

Solve the following equations by completing the square.

22. $x^2 + 2x - 6 = 0$

23. $2x^2 + 8x + 3 = 0$

24. Derive the quadratic formula by completing the square on the given equation.

$$ax^2 + bx + c = 0$$

Find the equation of a line with the given properties

25. Slope = $\frac{2}{3}$ and passes through (2,1)

26. Passes through (3, 6) and (2, 7)

27. A line with slope -3 and passing through (1,5) is perpendicular to another line passing through (1,1). Find the equations of both lines.

28. The function f(x) is a line. If the slope of f(x) is 3 and f(2)=5, then find f(7).

29. Find the equation of the line that has x-intercept at 4 and y-intercept at 1.

Find the inverse of the function

30. $f(x) = \frac{1}{8}x^3 - 3$

31. $f(x) = (x+1)^2 + 2$

32. Does $y = 3x^2 - 9$ have an inverse function? Explain your answer.

Find the domain and range of the following. Consider domain restrictions (denominator≠0, log>0, etc) and range restrictions (reasoning). As a last resort look at it on a graphing calculator.

33. $f(x) = \frac{3}{x-2}$

34. $y = \log(x-3)$

35. $y = x^4 + x^2 + 2$

36. $f(x) = \sqrt{2x-3}$

37. $y = |x-5|$

38. $f(x) = \begin{cases} x, & if\ x \geq 0 \\ 1, & if\ -1 \leq x < 0 \\ x-2, & if\ x < -1 \end{cases}$

Identify any vertical, horizontal, or slant asymptotes.

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

40. $y = \frac{3x^2}{2x^2-3x+3}$

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

42. $y = \frac{2x^2}{3x^3-4x+1}$

Identify as odd, even, or neither. (Show the substitutions!)

43. $f(x) = x^3 + 3x$

44. $f(x) = x^4 - 6x^2 + 3$

45. $f(x) = \sin(2x)$

46. $y = p^2 + 6p - 4$

Points of intersection

47. $x + y = 8$
$4x - y = 7$

48. $x^2 + y^2 = 5$
$x - y = 1$

Simplify the expressions (without a calculator)

49. $log_4 \frac{1}{16}$

50. $log_w w^{45}$

51. $\ln e^2$

52. $3log_3 3 - \frac{3}{4} log_3 81 + \frac{1}{3} log_3 \frac{1}{27}$

Solve the equations (no calculator)

53. $log_6(x + 3) + log_6(x + 4) = 1$

54. $\log x^2 - \log 100 = \log 1$

55. $\ln(2x - 1) = 3$

Simplify.

56. $\frac{(\tan^2 x)(\csc^2 x) - 1}{\csc x \tan^2 x \sin x}$

57. $\sec^2 x - \tan^2 x$

Solve the equations.

58. $\cos^2 x = \cos x + 2,\ 0 \le x \le 2\pi$

59. $2\sin(2x) = \sqrt{3},\ 0 \le x \le 2\pi$

AP Calculus **Name:** ____________________

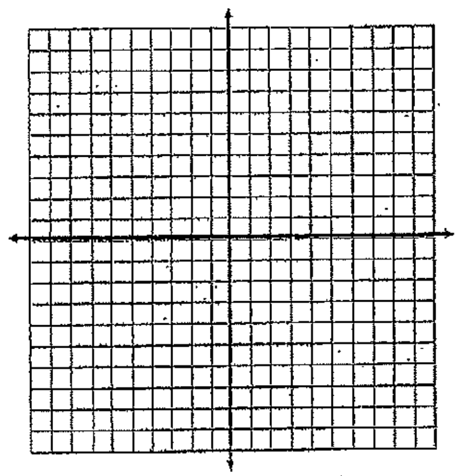
Summer Assignment - Graphing

Directions: Without a calculator, give the name of the parent function, give the equation of the parent function, graph the given function and the parent function, and describe the transformation of the parent function to the given function.

1. $g(x) = -(x+3)^2 - 1$ Name of Parent Function: ______________________

   Equation of Parent Function: ____________________

   Graph:

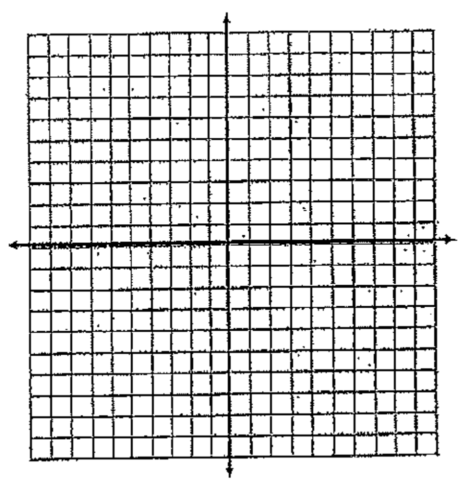


   Transformation: ________________________________

2. $g(x) = -|x-1|$ Name of Parent Function: ______________________

   Equation of Parent Function: ____________________

   Graph:

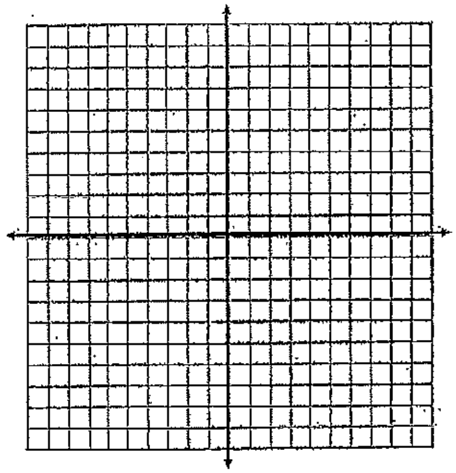


   Transformation: ________________________________

3. $h(x) = \sqrt{x-2}$ Name of Parent Function: ____________________

Equation of Parent Function: ____________________

Graph:

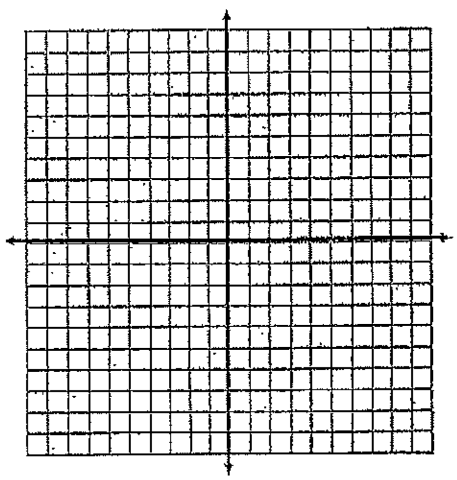


Transformation: ______________________________

4. $g(x) = -\dfrac{1}{x+6} + 2$ Name of Parent Function: ____________________

Equation of Parent Function: ____________________

Graph:



Transformation: ______________________________

Directions: Identify the domain and range of the function using interval notation (you may want to sketch a graph). Describe the transformation of the given function from its parent function.

5. $g(x) = \sqrt{x-1}$ Domain : ____________ Range : ____________

Transformation: ____________________________

6. $h(x) = -x^3 + 1$ Domain : ____________ Range : ____________

Transformation: ____________________________

7. $h(x) = -|x-2|$ Domain : ____________ Range : ____________

Transformation: ____________________________

8. $f(x) = e^{x+2}$ Domain : ____________ Range : ____________

Transformation: ____________________________

9. $h(x) = -(x+9)^2$ Domain : ____________ Range : ____________

Transformation: ____________________________

Directions: Given the parent function and a description of the transformation, write the equation of the transformed function, f(x).

10. Absolute value—vertical shift up 5, horizontal shift right 3.

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11. Square Root— Reflection over the x-axis, horizontal shift left 2.

____

12. Inverse Variation (odd power) —Reflection over the x-axis, horizontal shift left 8, vertical translation down 3.

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NAME ______________________ DATE ______________ PERIOD ________

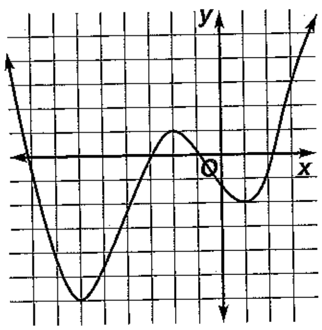
3-6

Practice

Critical Points and Extrema

Locate the extrema for the graph of y = f(x). Name and classify the extrema of the function.

1.



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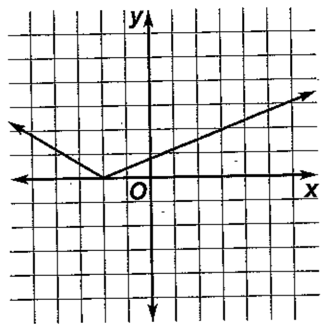
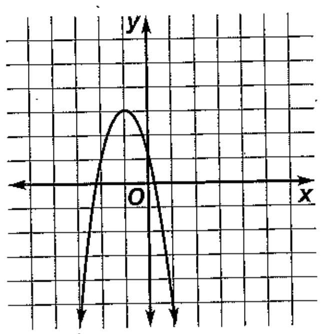
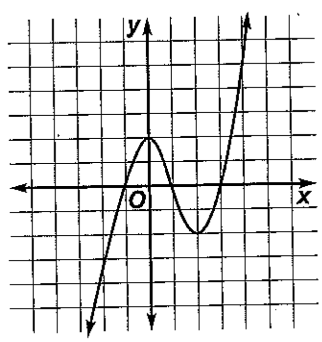


3.



4.



Determine whether the given critical point is the location of a maximum, a minimum, or a point of inflection.

5. $y = x^2 - 6x + 1, x = 3$

6. $y = x^2 - 2x - 6, x = 1$

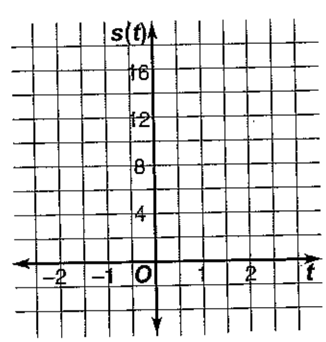
7. $y = x^4 + 3x^2 - 5, x = 0$

8. $y = x^5 - 2x^3 - 2x^2, x = 0$

9. $y = x^3 + x^2 - x, x = -1$

10. $y = 2x^3 + 4, x = 0$

11. ***Physics*** Suppose that during an experiment you launch a toy rocket straight upward from a height of 6 inches with an initial velocity of 32 feet per second. The height at any time t can be modeled by the function $s(t) = -16t^2 + 32t + 0.5$ where $s(t)$ is measured in feet and t is measured in seconds. Graph the function to find the maximum height obtained by the rocket before it begins to fall.



1.10 The Possibilities Are Limitless...

REFER TO THE GRAPH OF $R(x)$ TO EVALUATE THE FOLLOWING.

170. $\lim_{x\to\infty} R(x)$

171. $\lim_{x\to-\infty} R(x)$

172. $\lim_{x\to a^+} R(x)$

173. $\lim_{x\to a^-} R(x)$

174. $\lim_{x\to a} R(x)$

175. $\lim_{x\to 0} R(x)$

176. $\lim_{x\to b^+} R(x)$

177. $\lim_{x\to b^-} R(x)$

178. $\lim_{x\to b} R(x)$

179. $\lim_{x\to c} R(x)$

180. $\lim_{x\to d} R(x)$

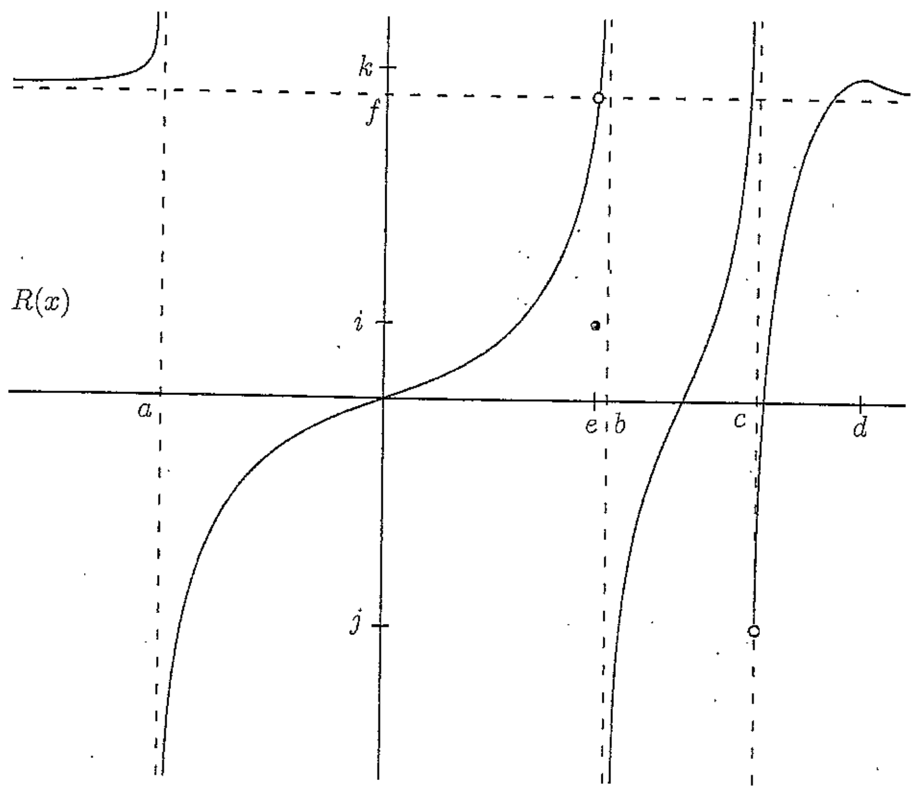
181. $\lim_{x\to e} R(x)$

182. $R(e)$

183. $R(0)$

184. $R(b)$

185. $R(d)$



One of the big misapprehensions about mathematics that we perpetrate in our classrooms is that the teacher always seems to know the answer to any problem that is discussed. This gives students the idea that there is a book somewhere with all the right answers to all of the interesting questions, and that teachers know those answers. And if one could get hold of the book, one would have everything settled. That's so unlike the true nature of mathematics. —*Leon Hankin*