Math 190 – Spring 2017
Assignment G8
Due: Today in class

Names: ____________________
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1. $x - 3(6 + x) = 1 - (x + 2)$ $x =$ __________

2. $5x(x + 3) = x + 3$ $x =$ __________

3. $\frac{x^2-20}{x^2-7x+12} = \frac{3}{x-3} + \frac{5}{x-4}$ $x =$ __________

4. $(5\sqrt{3} + 1)(3\sqrt{3} - 1) =$ __________

5. The equation of the line through the points (0, -2) and (3, 1) is ____________________

6. The equation of the line through the point (4, -2) and that is parallel to $y = -3x + 3$ is____________

7. The equation of the line perpendicular to $3x + 2y = 9$ and that crosses the graph of $f(x) = 3x^2 - 1$ at its vertex is ____________.

8. The area of the region bounded by the x-axis, the y-axis, the graph of the function $y = -3x + 12$, and the line $x = 2$ is _____ square units.

9. The area of the region bounded by $y = 4$ and $y = 2 + |x|$ is _____ square units.

10. The area of the region within the graph of the equation $(x - 2)^2 + y^2 = 4$ on the interval [2,4] is _____ square units.

11. $\lim_{x\to 4} 3x + 5 =$__________

12. $\lim_{x\to 1} |1 - x| =$__________

13. $\lim_{x\to 1} x + |1 - x| =$__________

14. $\lim_{x\to 0^+} \frac{\sqrt{x}}{x} =$__________

15. $\lim_{x\to 0^-} \frac{\sqrt{x}}{x} =$__________

16. $\lim_{x\to 1} x^n =$ _____

17. Let M be the slope between (1, 1) and the point (a, a^2) on the graph of $y = x^2$.

a. $\lim_{a\to 2} M =$

b. $\lim_{a\to 1} M =$

18. Let A be the area between the graph of $f(x) = x + 2$ and the x-axis from $x = 2$ to $x = r$.

a. $\lim_{r\to 6} A =$ _____

b. $\lim_{r\to 2^+} A =$ _____

c. $\lim_{r\to 4} 2A =$ _____

d. $\lim_{r\to 0} A =$ _____

19. $\lim_{x \to 0} \frac{x}{\sqrt{x+1}-1} =$

20. $\lim_{x \to \frac{1}{2}^-} \frac{|2x-1|}{2x-1} =$

21. $\lim_{x \to 3} \sqrt{x-3} =$

22. $\lim_{x \to 3^+} \sqrt{x-3} =$

23. $\lim_{x \to 1} \frac{1-a^2}{1-a} =$

24. $\lim_{a \to 4} \frac{2-\sqrt{a}}{4-a} =$

25. $\lim_{x \to 2} \frac{8-a^3}{2-a} =$

26. $\lim_{x \to 1} \frac{1-\frac{1}{a}}{1-a} =$

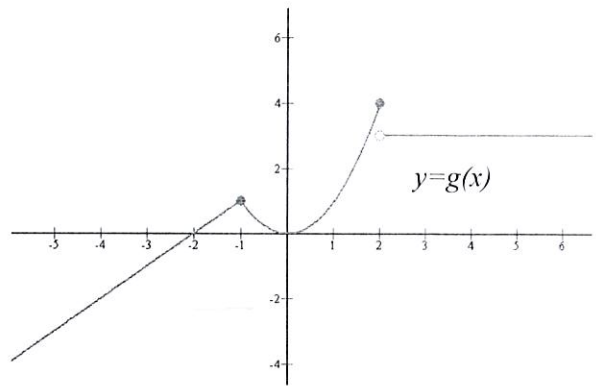
27. $\lim_{x \to -1} g(x)$ = ________ in the graph shown.

28. $\lim_{x \to -1} g(x)$ ________ in the graph shown.

29. $\lim_{x \to 2} g(x)$ = ________ in the graph shown.

30. $\lim_{x \to 2^-} g(x)$ = ________ in the graph shown.

31. $\lim_{x \to 2^+} g(x)$ = ________ in the graph shown.



32. Draw the graph of a single function that has all of these properties:

- $\lim_{x \to -4^+} f(x) = 2$
- $\lim_{x \to 0} f(x) = 0$
- $f(-4) = 0$
- $f(0) = 2$

33. Compute these limits:

a. $\lim_{x \to -\infty} \frac{2x^3-1}{x^2+1} =$

b. $\lim_{x \to \infty} \frac{2x^3-1}{x^2+1} =$

c. $\lim_{x \to -\infty} \frac{2x^3-1}{x^3+1} =$

d. $\lim_{x \to \infty} \frac{2x^3-1}{x^3+1} =$

e. $\lim_{x \to -\infty} 1 - x^4 =$

f. $\lim_{x \to \infty} 1 - x^4 =$

34. Graph the function $g(x) = \begin{cases} -x, & \text{if } x < -2 \\ 3, & \text{if } -2 \le x \le 2 \\ x, & \text{if } x > 2 \end{cases}$ below. Then, identify and classify all discontinuities.

35. Find the value of *a* that makes *g(x)* a continuous function $g(x) = \begin{cases} -x + a, & \text{if } x < 0 \\ 1, & \text{if } x = 0 \\ x + a, & \text{if } x > 0 \end{cases}$

36. Find values of *a* and *b* that makes *f(x)* a continuous function: $f(x) = \begin{cases} 3x^2 - 1, & \text{if } x \ge 2 \\ ax + b, & \text{if } x < 2 \end{cases}$

37. Draw the graph of a single function that has all of these properties:

- *f(x)* is continuous on the interval (-∞, 0) ∪ (0, ∞)
- $\lim_{x \to 0} f(x) = 0$
- *f(0) = 2*
- $\lim_{x \to \infty} f(x) = 0$
- $\lim_{x \to -\infty} f(x) = 0$

38. For each function below, use the definition of the derivative function to compute *f ' (x)*

a. $f(x) = \frac{2}{x}$

b. $f(x) = 3x^2 - x$

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

39. Use the short-cut rules for differentiation to identify the derivatives of these functions:

a. $\frac{d}{dx}(3x^3) =$

b. $\frac{d}{dx}(2x^6) =$

c. $\frac{d}{dx}(4\sqrt{x}) =$

d. $\frac{d}{dx}\left(\frac{3}{x^3}\right) =$

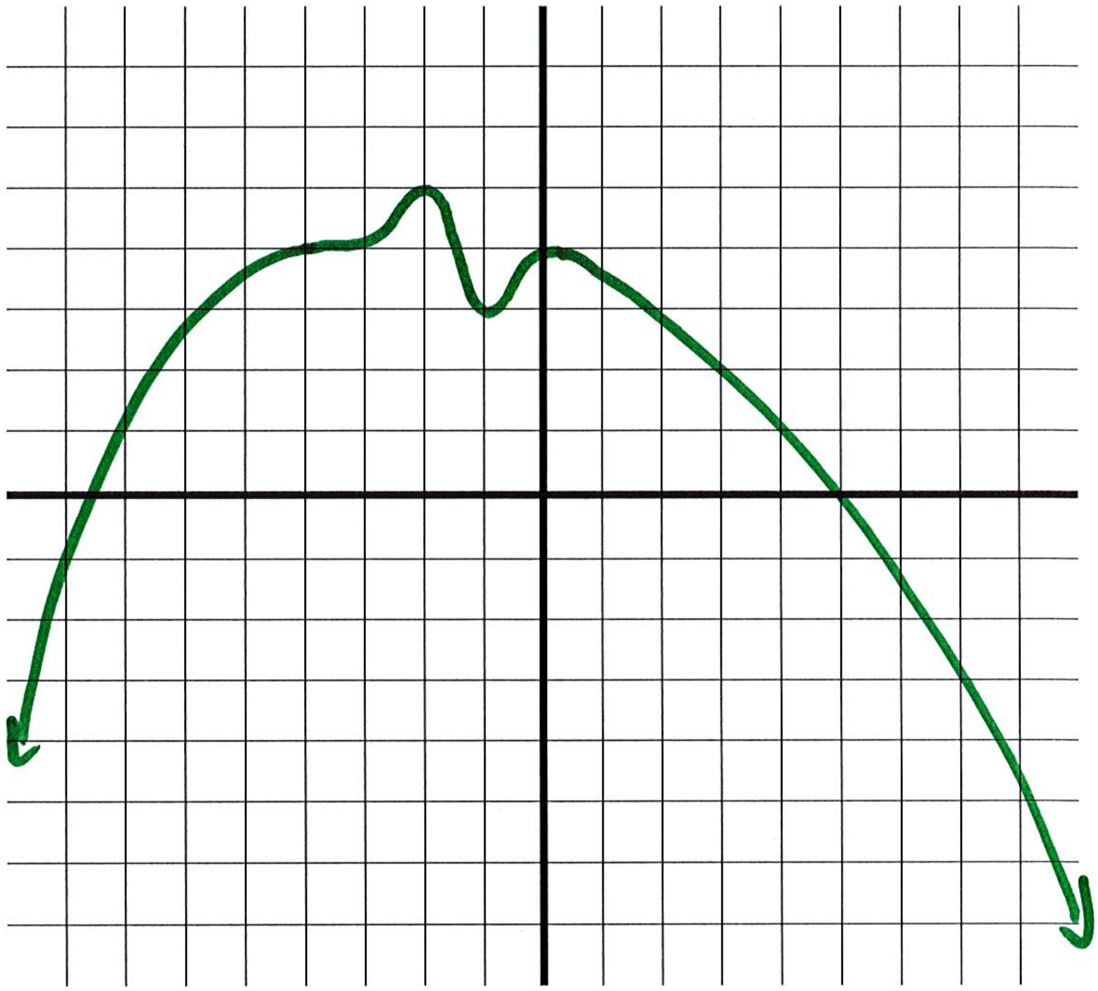
e. $\frac{d}{dx}\left(\frac{x+1}{x}\right) =$

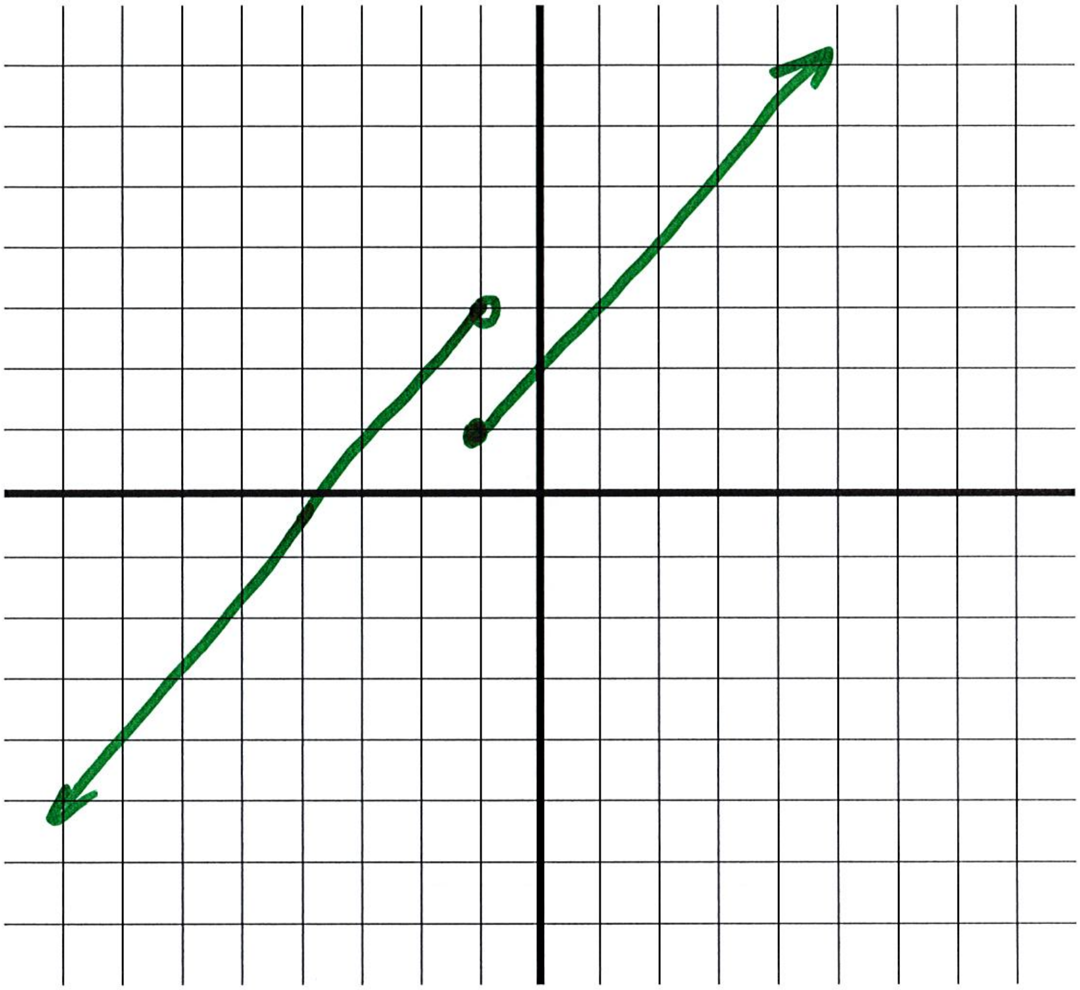
f. $\frac{d}{dx}\left(\frac{x^2-x}{x}\right) =$

g. $\frac{d}{dx}(3x^3 + x^2 - x + 4) =$

h. $\frac{d}{dx}\left(8\sqrt[3]{x} + \frac{3}{x}\right) =$

40. For each graph below, sketch the graph of the derivative.





41. Use the Chain Rule to compute the following derivatives.

a. $\frac{d}{dx}((-x^2 + 7x - 5)^4) =$

c. $\frac{d}{dx}\left(\frac{1}{3-\sqrt{x}}\right) =$

b. $\frac{d}{dx}\left(\sqrt{1-2x}\right) =$

d. $\frac{d}{dx}\left(\frac{4x^3-1}{\sqrt{x^2+9}}\right) =$

42. Find the equation of the line tangent to the graph of the functions below at the points indicated.

a. $f(x) = (-x^2 + 7x - 5)^4$ where x = 1

b. $f(x) = \sqrt{1-2x}$ where x = -2.

c. $f(x) = \frac{4x^3-1}{\sqrt{x^2+9}}$ = where x = 0

43. Use Implicit Differentiation to compute $\frac{dy}{dx}$ for each of these functions.

a. $xy = 1 + \frac{x}{y^2}$

b. $\sqrt{x+3} + y = 2x^2y^2$

c. $\frac{y}{\sqrt{1+x^4}} = (1 + x^3)y$

44. Find the equation of the line tangent to the graph of the equations below at the points indicated.

a. $\sqrt{x+3} + y = 2x^2y^2 + 2$ at (1, 0)

b. $\frac{y}{\sqrt{1+x^4}} = (1 + x^3)y$ at (0, 1)

45. A screen saver displays the outline of a 2 cm by 3 cm rectangle and then expands the rectangle in such a way that the 2 cm side is expanding at the rate of 4 cm/sec and the ratio of the sides of the rectangle remains constant. How fast is the area of the rectangle increasing when its dimensions are 8 cm by 12 cm?

46. A receptacle is in the shape of an inverted square pyramid 10 inches in height and with a 6 x 6 square base. The volume of such a pyramid is given by

$$V = \frac{1}{3}x^2h$$

where x is the length of a side of the square base.

Suppose that the receptacle is being filled with water at the rate of 0.2 cubic inches per second. How fast is water rising when it is 2 inches deep?