

Calculus Summer Assignment

This packet includes material your teacher expects you to know when you begin the course. It is designed to be done over the course of the summer to provide practice and highlight the Precalculus concepts you learned that are essential for your success in Calculus.

Instructions:

- Complete the packet on loose leaf paper.
- Write your name and the course on the top of every sheet you use.
- Number your work and do the problems in order.
- Copy each problem before showing your work.
- Check your answers as you go (answers are included at the end of the packet).

The completed assignment is due on the first day of class and is worth 25 points. You will take a 50 point Quiz on this material on the 3rd day of class.

SHOW ALL WORK clearly.

Simplify as fully as possible. Leave final answers with only positive exponents.

$$1. 2(3x-1)^2 - 3(2x^2 + x - 1) \qquad 2. \left(\frac{a^5 b^{1/2} c^3 d^{-2}}{ab^{-1/2} c^5 d^2} \right)^{-2} \qquad 3. \frac{6x^{5/2}}{12\sqrt{x}}$$

Leave final answer in factored form.

$$4. \frac{x^2 - 25}{x^2 - 4x - 5} \div \frac{2x + 10}{x^2 - 1} \qquad 5. \frac{(x-3)^3(x+2)^{-1}}{(x-3)^5(x+2)^{-2}}$$

Solve each equation for x.

$$\begin{array}{lll} 6. 3x^2 - 12 = 0 & 9. \sqrt{2x+7} - x = 2 & 12. 2(x-2)^{3/2} = 54 \\ 7. |x^2 - 3x| = -4x + 6 & 10. 2^{3x-1} - 4 = 28 & 13. 3x^3 - x^2 = x \\ 8. \frac{x+1}{x} - \frac{x}{x+1} = 0 & 11. 2x^4 - 14x^2 + 24 = 0 & 14. 4x^3 - 8x^2 - 25x + 50 = 0 \end{array}$$

Inequalities

$$\begin{array}{l} 15. \text{Solve and graph on a number line: } -2|x-4| \leq -14. \\ 16. \text{Solve and graph on a number line: } 2x^2 - 7x \geq -3 \text{ (use critical numbers to make a sign graph)} \end{array}$$

Factor Completely:

$$\begin{array}{l} 17. 6x^4 - 22x^2 - 8 \\ 18. 16x^4 - 1 \\ 19. (x-3)^2 - 2x(x-3) \end{array}$$

Functions

Use $t(x) = 2x + 5$ and $k(x) = 3 - x^2$ for #20 and 21.

20. Determine $(k \circ t)(x)$, in simplified form.

21. Determine $t(k(x))$, in simplified form.

Use the functions given for #22-23

$$f(x) = -(x+3)^2 + 2$$

$$g(x) = -\frac{1}{2}|x-5|$$

$$h(x) = \sqrt{x+1} - 3$$

22. Evaluate $f(g(1))$.

23. Evaluate $g(h(3))$

24. Sketch $f(x) = -(x+3)^2 + 2$ on graph paper (no calculator). State the domain and range.

25. Sketch $h(x) = \sqrt{x+1} - 3$ on graph paper (no calculator). State the domain and range.

26. Sketch the piecewise function below on graph paper, and then find the domain and range.

$$f(x) = \begin{cases} 3 - x^2, & x \leq -1 \\ 4, & -1 < x < 2 \\ 3x - 2, & x \geq 2 \end{cases}$$

27. Use the piecewise function above to evaluate a-d:

a. $f(3)$

b. $f(-3)$

c. $f(2)$

d. $f(0)$

e. $f(-1)$

28. Discuss the end behavior of $g(x) = -4x^7 - 5x^5 + 3x^4 + 4x^3 - x^2 + 2x - 6$.

29. Use $f(x) = 2x^2 + 1$ to evaluate a) $f(x+h)$ and b) $f(x+h) - f(x)$.

30. Is $f(x) = 5x^4 - 3x^2 - 1$ odd, even, or neither? Justify analytically.

Lines and Intersections with lines

31. Find the equation of the line, in standard form, that is perpendicular to the line containing (6,1) and (4,-3) and has the same y-intercept as $2x - 3y = 6$.

32. Find the equation of the line, in standard form, that goes through the vertex of the parabola $y = 2x^2 - 12x + 16$ and that is parallel to $2x - 3y = 6$.

33. Find the point of intersection of the lines $3x - y - 7 = 0$ and $x + 5y + 3 = 0$ analytically (no calculator).

Trigonometry

Evaluate each trigonometric expression. Use *exact* values (no calculators).

34. $\tan \frac{3\pi}{4}$

35. $\csc\left(-\frac{\pi}{6}\right)$

36. $\sec\left(-\frac{\pi}{2}\right)$

37. $\cos \frac{7\pi}{4}$

38. $\sin\left(-\frac{7\pi}{3}\right)$

39. $\cos(3\pi)$

40. Evaluate the exact value of $\sin(2\theta)$ for $\theta = \frac{\pi}{3}$.

Answers to Calculus Summer Review Packet

SHOW ALL WORK clearly.

1. $12x^2 - 15x + 5$

2. $\frac{c^4 d^8}{a^8 b^2}$

3. $\frac{1}{2}x^2$

4. $\frac{x-1}{2}$

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

6. $x = \pm 2$

7. $x = -3, 1$

8. $x = -\frac{1}{2}$

9. $x = 1$

10. $x = 2$

11. $x = \pm 2, \pm\sqrt{3}$

12. $x = 11$

13. $x = 0, \frac{1 \pm \sqrt{13}}{6}$

14. $x = -\frac{5}{2}, 2, \frac{5}{2}$

15. $x \leq -3$ or $x \geq 11$

16. $\left(-\infty, \frac{1}{2}\right] \cup [3, \infty)$

17. $2(3x^2 + 1)(x - 2)(x + 2)$

18. $-(x - 3)(x + 3)$

19. $(2x - 1)(2x + 1)(4x^2 + 1)$

20. $-4x^2 - 20x - 22$

21. $11 - 2x^2$

22. 1

23. -3

24. parabola opening down, vertex $(-3, 2)$; $D =$ all reals, $R = (-\infty, 2]$

25. domain = $[-1, \infty)$; range = $[-3, \infty)$

26. domain = all reals,
range = $(-\infty, 2] \cup [4, \infty)$

27. a. 7 b. -6 c. 4 d. 4 e. 2

28. As $x \rightarrow -\infty, g(x) \rightarrow +\infty,$
As $x \rightarrow +\infty, g(x) \rightarrow -\infty$

29. a) $f(x+h) = 2x^2 + 4xh + 2h^2 + 1$ and
b) $f(x+h) - f(x) = 4xh + 2h^2.$

30. even, $f(-x) = f(x)$

31. $x + 2y = -4$

32. $2x - 3y = 12$

33. $(2, -1)$

34. -1

35. -2

36. undefined

37. $\frac{\sqrt{2}}{2}$

38. $-\frac{\sqrt{3}}{2}$

39. -1

40. $\frac{\sqrt{3}}{2}$

