

AP Calculus Summer Review Packet

Name _____

This packet is a review of the entering objectives for *AP Calculus* and is very important to your success in AP Calculus. Please try to do each problem **showing the work** on another sheet of paper. The answers are included in the packet. Our objective is to *understand the concepts* and not just rely on the mechanics. **Bring the packet with you to AP Calculus class on the first day of school.** This packet will be assessed as a study skill.

I. Simplify. Show the work that leads to your answer.

$$1. \frac{x-4}{x^2-3x-4} \quad 2. \frac{x^3-8}{x-2} \quad 3. \frac{5-x}{x^2-25} \quad 4. \frac{x^2-4x-32}{x^2-16}$$

II. Trigonometric Identities.

$$1. \text{ Pythagorean} = \underline{\hspace{2cm}} \quad 2. \cos 2x = \underline{\hspace{2cm}}$$
$$\underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$$
$$3. \sin 2x = \underline{\hspace{2cm}}$$

III. Simplify each expression.

$$1. \frac{1}{x+h} - \frac{1}{x} \quad 2. \frac{\frac{2}{x^2}}{\frac{10}{x^5}} \quad 3. \frac{\frac{1}{3+x} - \frac{1}{3}}{x} \quad 4. \frac{2x}{x^2-6x+9} - \frac{1}{x+1} - \frac{8}{x^2-2x-3}$$

IV. Solve for z :

$$1. 4x + 10yz = 0 \quad 2. y^2 + 3yz - 8z - 4x = 0$$

V. If; $f(x) = \{(3,5), (2,4), (1,7)\}$ $g(x) = \sqrt{x-3}$ $h(x) = \{(3,2), (4,3), (1,6)\}$ $k(x) = x^2 + 5$
determine each of the following:

$$1. (f+h)(1) = \quad 2. (k-g)(5) = \quad 3. (f \circ h)(3) = \quad 4. (g \circ k)(7) =$$
$$5. f^{-1}(x) = \quad 6. k^{-1}(x) = \quad 7. \frac{1}{f(x)} = \quad 8. (kg)(x) =$$

VI. Miscellaneous: Follow the directions for each problem.

1. Evaluate $\frac{f(x+h)-f(x)}{h}$ and simplify if $f(x) = x^2 - 2x$.
 2. Expand $(x + y)^3$
 3. Simplify: $x^{\frac{3}{2}}(x + x^{\frac{5}{2}} - x^2)$
 4. Eliminate the parameter and write a rectangular equation for $\begin{matrix} x = t^2 + 3 \\ y = 2t \end{matrix}$
-

VII. Expand and simplify:

1. $\sum_{n=0}^4 \frac{n^2}{2}$
 2. $\sum_{n=1}^3 \frac{1}{n^3}$
-

VIII. Simplify

1. $\frac{\sqrt{x}}{x}$
 2. $e^{\ln 3}$
 3. $e^{(1+\ln x)}$
 4. $\ln 1$
 5. $\ln e^7$
 6. $\log_3(1/3)$
 7. $\log_{1/2} 8$
 8. $\ln \frac{1}{2}$
 9. $e^{3 \ln x}$
 10. $\frac{4xy^{-2}}{12x^{\frac{1}{3}}y^{-5}}$
 11. $27^{2/3}$
 12. $(5a^{2/3})(4a^{3/2})$
 13. $(4a^{5/3})^{3/2}$
 14. $\frac{3(n+1)!}{5n!}$
-

IX. Using the point-slope form $y - y_1 = m(x - x_1)$, write an equation for the line

1. with slope -2 , containing the point $(3, 4)$
 2. containing the points $(1, -3)$ and $(-5, 2)$
 3. with slope 0 , containing the point $(4, 2)$
 4. parallel to $2x - 3y = 7$ and passes through $(5, 1)$
 5. perpendicular to the line in problem #1, containing the point $(3, 4)$
-

X. Given the vectors $\mathbf{v} = -2\mathbf{i} + 5\mathbf{j}$ and $\mathbf{w} = 3\mathbf{i} + 4\mathbf{j}$, determine

1. $\frac{1}{2}\mathbf{v}$ 2. $\mathbf{w} - \mathbf{v}$ 3. length of \mathbf{w} 4. the unit vector for \mathbf{v}
-

XI. Without a calculator, determine the exact value of each expression.

1. $\sin 0$ 2. $\sin \frac{\pi}{2}$ 3. $\sin \frac{3\pi}{4}$ 4. $\cos \pi$
5. $\cos \frac{7\pi}{6}$ 6. $\cos \frac{\pi}{3}$ 7. $\tan \frac{7\pi}{4}$ 8. $\tan \frac{\pi}{6}$
9. $\tan \frac{2\pi}{3}$ 10. $\tan \frac{\pi}{2}$ 11. $\cos(\sin^{-1} \frac{1}{2})$ 12. $\sin^{-1}(\sin \frac{7\pi}{6})$

XII. For each function, determine its domain and range.

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

XIII. Determine all points of intersection.

1. parabola $y = x^2 + 3x - 4$ and line $y = 5x + 11$ 2. $y = \cos x$ and $y = \sin x$ in the first quadrant
-

XIV. Solve for x , where x is a real number. Show the work that leads to your solution.

1. $x^2 + 3x - 4 = 14$ 2. $\frac{x^4 - 1}{x^3} = 0$ 3. $(x - 5)^2 = 9$
4. $2x^2 + 5x = 8$ 5. $(x + 3)(x - 3) > 0$ 6. $x^2 - 2x - 15 \leq 0$
7. $12x^2 = 3x$ 8. $\sin 2x = \sin x$, $0 \leq x \leq 2\pi$ 9. $|x - 3| < 7$
10. $(x + 1)^2(x - 2) + (x + 1)(x - 2)^2 = 0$ 11. $27^{2x} = 9^{x-3}$
12. $\log x + \log(x - 3) = 1$ 13. $e^{3k} = 5$ 14. $\ln y = 2t - 3$
-

XV. Graph each function. Give its domain and range.

1. $y = \sin x$

2. $y = \cos x$

3. $y = \tan x$

4. $y = x^3 - 2x^2 - 3x$

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

6. $y = \frac{x+4}{x-1}$

7. $y = \frac{x^2 - 4}{x+2}$

8. $y = e^x$

9. $y = \sqrt{x}$

10. $y = \sqrt[3]{x}$

11. $y = \ln x$

12. $y = |x + 3| - 2$

13. $y = \frac{1}{x}$

14. $y = \begin{cases} x^2 & \text{if } x < 0 \\ x + 2 & \text{if } 0 \leq x \leq 3 \\ 4 & \text{if } x > 3 \end{cases}$

XVI. Identify, by name, each polar graph. Give at least one characteristic of each graph (e.g. radius, location, length of petal, point (other than the pole) on the graph, etc.)

1. $r = 2$

2. $r = 3 \sec \theta$

3. $r = 1 + \sin \theta$

4. $r = 2 \cos 3\theta$
