

## AP Calculus Review Worksheet

This packet is a review of the entering objectives for AP Calculus and is due on the first day back to school. It is to be done neatly and on a separate sheet of paper. Have a great summer!

### I. Simplifying Rational Expressions

Simplify. (Show your work!)

1.  $\frac{x-4}{x^2-3x-4}$

2.  $\frac{x^3-8}{x-2}$

3.  $\frac{5-x}{x^2-25}$

4.  $\frac{x^2-4x-32}{x^2-16}$

### II. Trigonometric Identities

1. Pythagorean Identities \_\_\_\_\_

\_\_\_\_\_

2.  $\cos 2x =$  \_\_\_\_\_

\_\_\_\_\_

3.  $\sin 2x =$  \_\_\_\_\_

### III. Operations with Rational Expressions

1.  $\frac{1}{x+h} - \frac{1}{x}$

2.  $\frac{\frac{2}{x^2}}{\frac{10}{x^5}}$

$$3. \quad \frac{\frac{1}{3+x} - \frac{1}{3}}{x}$$

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

#### IV. Solving equations

Solve for Z

$$1. \quad 4x + 10yz = 0$$

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

#### V. Operations with functions

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 the following:

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

$$x = t^2 + 3$$

$$y = 2t$$

## VII. Series

Expand and simplify.

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

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

## VIII. Simplifying Expressions

Simplify.

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

2.  $e^{\ln 3}$

3.  $e^{(1+\ln x)}$

4.  $\ln 1$

5.  $\ln e^7$

6.  $\log_3\left(\frac{1}{3}\right)$

7.  $\log_{\frac{1}{2}} 8$

8.  $\ln \frac{1}{2}$

9.  $e^{3 \ln x}$

10.  $\frac{4xy^{-2}}{12x^{\frac{1}{3}}y^{-5}}$

11.  $27^{\frac{2}{3}}$

12.  $(5a^{\frac{2}{3}})(4a^{\frac{3}{2}})$

13.  $(4a^{\frac{5}{3}})^{\frac{3}{2}}$

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 a slope of -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. Trigonometry

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.  $\sin^{-1}(\sin \frac{7\pi}{6})$

#### XI. Domain and Range

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

#### XII. Determine all points of intersection

1.  $y = x^2 + 3x - 4$   
 $y = 5x + 11$
2.  $y = \cos x$   
 $y = \sin x$  in the 1<sup>st</sup> quadrant

### XIII. Solving equations

Solve for  $x$ , where  $x$  is a real number. Show your work.

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.  $e^{3x} = 5$

14.  $\ln y = 2x - 3$