

Name: _____

Date: _____

Calculus AP

Summer Packet

Show all work for each problem to receive credit for answers. Unless otherwise specified, all answers should be exact values.

1. Use an absolute value to define the given interval: All numbers that are at most ten units from 15.

2. Solve the following. Write the solution in interval notation.

a. $|3x + 1| \geq 4$

b. $x^2 + x - 1 < 5$

3. Sketch the graph of the following equations. Identify any intercepts, test for symmetry and determine if the function is even, odd, or neither:

a. $y = \sqrt{9 - x^2}$

Even Odd Neither

Intercepts: _____

Symmetry: _____

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

Even Odd Neither

Intercepts: _____

Symmetry: _____

4. Find the intercepts of $y = \frac{x^2-9}{x+1}$

5. Find all points of intersection of the graphs of $x^2 + y^2 = 25$ and $2x + y = 10$.

6. Write an equation of the line using the given information:

a. Passes through (4,1) and (-4,7)

b. Parallel to the line in (a) and passes through (-6,4)

c. Perpendicular to the line in (a) and passes through (-6,4)

7. Given $f(x) = \sqrt{x+2}$ and $g(x) = x^2 + 4$, find $f(g(x))$ and $g(f(x))$ and state the domain and range of all four functions.

Domain of $f(x)$: _____

Domain of $g(x)$: _____

Range of $f(x)$: _____

Range of $g(x)$: _____

$f(g(x)) =$

Domain of $f(g(x))$: _____

Range of $f(g(x))$: _____

$g(f(x)) =$

Domain of $g(f(x))$: _____

Range of $g(f(x))$: _____

8. Given $f(x) = 2x^2 + 5$, find $\frac{f(x+\Delta x) - f(x)}{\Delta x}$.

Simplify the given expressions and make sure to have a common denominator.

9. $\frac{x^2 - 5x + 4}{x^2 - 2x - 8}$

10. $\frac{\frac{1}{x+4} - \frac{1}{4}}{x}$

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

12. $x^{-1/2} - \frac{5}{2}x^{-3/2}$

13. $x^4 \left[\frac{(x+1)-(x-1)}{(x+1)^2} \right] + \left[\frac{x-1}{x+1} \right] (4x^3)$

14. Find the exact value of each of the remaining trig functions.

a. $\cos \theta = -\frac{4}{5}, \sin \theta < 0$

$\sin \theta =$ _____

$\csc \theta =$ _____

$\tan \theta =$ _____

$\sec \theta =$ _____

$\cot \theta =$ _____

b. $\tan \theta = -\frac{5}{12}, \cos \theta < 0$

$\sin \theta =$ _____

$\csc \theta =$ _____

$\cos \theta =$ _____

$\sec \theta =$ _____

$\cot \theta =$ _____

15. Find the exact value of each expression. Do not use a calculator.

a. $3 \sin \frac{\pi}{3} - 4 \cos \frac{3\pi}{2}$

b. $\sin\left(-\frac{\pi}{3}\right) - \cot\left(-\frac{5\pi}{4}\right)$

16. Express in radian measure as multiples of π :

a. -20

b. 150

c. -240

17. Solve each equation in the interval $0 \leq \theta \leq 2\pi$. Do not use a calculator.

a. $\tan \theta = -\frac{1}{\sqrt{3}}$

b. $\sec \theta = \sqrt{2}$

c. $\sin^2 \theta - 1 = 0$

d. $\tan^2 \theta = 3$

e. $-\sin \theta = \cos 2\theta$

f. $\sin 2\theta - \cos \theta = 0$

18. Use a calculator to approximate two values of θ in the interval $0 < \theta < 2\pi$ that satisfy the equation. Round your answers to three decimal places.

a. $\sin \theta = 0.8191$

b. $\cos \theta = 0.8746$

c. $\tan \theta = 0.6524$

d. $\sec \theta = -1.2241$

19. In traveling across flat land, you notice a mountain directly in front of you. Its angle of elevation (to the peak) is 3.5 degrees. After you drive 13 miles closer to the mountain, the angle of elevation is 9 degrees. Approximate the height of the mountain.

20. Let θ be an angle in standard position on the coordinate axis. The terminal side of the angle passes through the point $(-8, -15)$. Draw θ and determine all six trigonometric functions for the angle.

$$\sin \theta = \underline{\hspace{2cm}}$$

$$\csc \theta = \underline{\hspace{2cm}}$$

$$\cos \theta = \underline{\hspace{2cm}}$$

$$\sec \theta = \underline{\hspace{2cm}}$$

$$\tan \theta = \underline{\hspace{2cm}}$$

$$\cot \theta = \underline{\hspace{2cm}}$$

Expand the expression.

21. $\ln x^{1/2}y^3$

22. $\ln \frac{3y^4}{x^3}$

Condense the expression.

23. $\ln 20 + 2 \ln \frac{1}{2} + \ln x$

24. $3(\ln 3 - \ln x) + (\ln x - \ln 9)$
