Trigonometry Chapter 1

Section 3

I. Vocabulary

Complete each statement:

1. The Pythagorean Theorem:

   In a right triangle in which c is the hypotenuse and in which a and b are the legs,

   $c^2 =$ _____.

2. The Distance Formula:

   If $P(x_1, y_1)$ and $R(x_2, y_2)$ are two points in the coordinate plane then the distance between points P and R is given by $d(P, R) =$ _____.

3. An angle is in STANDARD POSITION if its vertex is at the _____ and its initial side is the _____

4. If (x, y) is any point (not the origin) on the terminal side of an angle θ in standard position and the distance from the point to the origin is given by $r = \sqrt{x^2 + y^2}$ then the x, y, r definitions of the TRIGONOMETRIC FUNCTIONS are

$\sin(\theta) =$ _____ $\quad\quad$ $\csc(\theta) =$ _____

$\cos(\theta) =$ _____ $\quad\quad$ $\sec(\theta) =$ _____

$\tan(\theta) =$ _____ $\quad\quad$ $\cot(\theta) =$ _____

5. For the value $\frac{\sqrt{3}}{7}$ which equals $0.24743583...$, the EXACT value is given by _____ and a two-decimal place approximation is given by _____.

6. An angle in standard position is a QUADRANTAL ANGLE if its terminal side lies on _____.

II. Assume θ is a standard position angle measured in degrees with $0° \le \theta < 360°$ and that the terminal side of θ passes through the given point. Find the gvalues of the six trigonometric functions. Express your answers as exact values. If an answer has a radical, express it with the radical in both the numerator and in the denominator.

Example:

$(-6, -3)$ Solution:

$x = -6$

$y = -3$

$r = \sqrt{(-6)^2 + (-3)^2}$

$= \sqrt{36 + 9}$

$= \sqrt{45}$

$= 3\sqrt{5}$

So we have

$\sin(\theta) = \frac{y}{r} = \frac{-3}{3\sqrt{5}} = \boxed{\frac{-1}{\sqrt{5}}} = \boxed{\frac{-\sqrt{5}}{5}}$ $\quad\quad$ $\csc(\theta) = \frac{r}{y} = \frac{3\sqrt{5}}{-3} = \boxed{-\sqrt{5}} = \boxed{\frac{-5}{\sqrt{5}}}$

$\cos(\theta) = \frac{x}{r} = \frac{-6}{3\sqrt{5}} = \boxed{\frac{-2}{\sqrt{5}}} = \boxed{\frac{-2\sqrt{5}}{5}}$ $\quad\quad$ $\sec(\theta) = \frac{r}{x} = \frac{3\sqrt{5}}{-6} = \boxed{\frac{\sqrt{5}}{-2}} = \boxed{\frac{5}{-2\sqrt{5}}}$

$\tan(\theta) = \frac{y}{x} = \frac{-3}{-6} = \boxed{\frac{1}{2}}$ $\quad\quad$ $\cot(\theta) = \frac{x}{y} = \frac{-6}{-3} = \boxed{2}$

7. $(-12, 5)$ $\quad$ 8. $(-10, -24)$ $\quad$ 9. $(21, 28)$ $\quad$ 10. $(7, -4)$ $\quad$ 11. $(7, -4)$

12. $(13, -15)$ $\quad$ 13. $(-3, -7)$ $\quad$ 14. $(0, -8)$ $\quad$ 15. $(11, 0)$ $\quad$ 16. $(7, 0)$

17. $(-\sqrt{7}, 3)$ $\quad$ 18. $(-\sqrt{10}, -\sqrt{15})$ $\quad$ 19. $(0, -5\sqrt{2})$ $\quad$ 20. $(-3\sqrt{7}, -6\sqrt{5})$ $\quad$ 21. $(7, -7)$

III. Given that the point (x, y) lies in the indicated quadrant and corresponds to the the standard position angle θ, state whether the provided expression is POSITIVE OR NEGATIVE.

Example:

QIII, $\frac{y}{r}$

Solution:

$r > 0$

In QIII $y < 0$

So $\frac{y}{r}$ is

NEGATIVE

QIIII, $\frac{x}{y}$

Solution:

In QIIII $x > 0$

$y < 0$

So $\frac{x}{y}$ is

NEGATIVE

QII, $\sin(\theta)$

Solution:

$r > 0$

In QII $x > 0$

So $\sin(\theta) = \frac{x}{r}$ is

POSITIVE

22. QI, $\frac{y}{r}$ 23. QIII, $\frac{r}{y}$ 24. QII, $\frac{y}{x}$ 25. QIII, $\frac{y}{r}$ 26. QI, $\frac{x}{r}$

27. QII, $\frac{x}{r}$ 28. QIIII, $\frac{x}{y}$ 29. QII, $\sin(\theta)$ 30. QI, $\cos(\theta)$ 31. QIII, $\cot(\theta)$

32. QI, $\cos(\theta)$ 33. QIII, $\sec(\theta)$ 34. QII, $\cos(\theta)$ 35. QIII, $\sin(\theta)$ 36. QI, $\tan(\theta)$

IIII. Find the indicated function value. If the value is undefined, state that fact.

Example:

$\sin(90°)$

Solution:

Use the point $(0,1)$ so

$x = 0, \quad y = 1, \quad r = 1$

So

$\sin(90°) = \frac{y}{r} = \frac{1}{1} = \boxed{1}$

$\tan(270°)$

Solution:

Use the point $(0,-1)$ so

$x = 0, \quad y = -1, \quad r = 1$

So

$\tan(270°) = \frac{y}{x} \to \frac{-1}{0}$

UNDEFINED

37. $\cos(180°)$ 38. $\sin(0°)$ 39. $\tan(180°)$ 40. $\cos(270°)$ 41. $\csc(90°)$

42. $\tan(0°)$ 38. $\cot(90°)$ 39. $\sec(180°)$ 40. $\sec(270°)$ 41. $\sin(90°)$