

Name: KEY

Date: _____

Precalculus

Cumulative Review #3

Due: _____

Directions: Show all work for full credit. Correct answers without supporting work will receive 1 credit.

1. The lengths of the sides of a triangle are 6 inches, 8 inches, and 12 inches. Find the area of the triangle.

$$s = \frac{6+8+12}{2} = 13$$

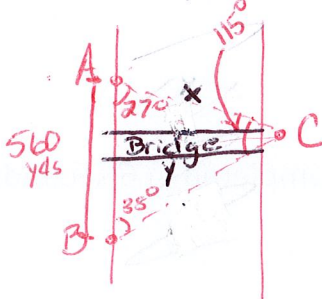
$$K = \sqrt{s(s-a)(s-b)(s-c)}$$

$$K = \sqrt{13(13-6)(13-8)(13-12)}$$

$$K = \sqrt{13(7)(5)(1)}$$

$$K = \sqrt{455} \approx 21.3 \text{ sq. inches}$$

2. Two surveyors are determining measurements to be used to build a bridge across a canyon. The two surveyors stand 560 yds apart on one side of the canyon and sight a marker on the other side of the canyon at angles of 27° and 38° (measure to the canyon wall on the side of the canyon they are currently standing). Find the length of the bridge if it built to the marker on the opposite side of the canyon.



$$\frac{\sin 115^\circ}{560} = \frac{\sin 38^\circ}{x}$$

$$x = \frac{560 \sin 38^\circ}{\sin 115^\circ}$$

$$x \approx 380 \text{ yds}$$

$$\sin 27^\circ = \frac{y}{380}$$

$$y = 380 \sin 27^\circ$$

$$y \approx 172.5 \text{ yd}$$

3. Find the area of a sector if the central angle measures 105° and the radius of the circle is 7.2 cm.

$$A = \frac{1}{2} r^2 \theta$$

$$A = \frac{1}{2} (7.2)^2 (105^\circ) \left(\frac{\pi}{180} \right)$$

$$A = \frac{105(\pi)(7.2)^2}{360} \approx 47.5 \text{ cm}^2$$

conversion to radians

or $15.12\pi \text{ cm}^2$

- 4a. A circular saw blade is rotating at 500 revolutions per minute. Find the angular velocity in radians per second.

$$\omega = \frac{\theta}{t} = \frac{500 \text{ rev}}{1 \text{ min}} \left(\frac{2\pi \text{ rad}}{1 \text{ rev}} \right) \left(\frac{1 \text{ min}}{60 \text{ sec}} \right)$$

$$= \frac{1000\pi}{60} = \frac{50\pi}{3} \text{ rad/sec}$$

or 52.3 rad/sec

- b. If the saw blade has a radius of 10 inches, find the linear velocity in feet per second.

$$v = r\omega$$

$$v = 10 \text{ in} \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) \left(\frac{50\pi \text{ rad}}{3 \text{ sec}} \right) = \frac{500\pi}{36} \approx 43.6 \text{ ft/sec}$$

5. Find the value of x in the interval $0^\circ \leq x \leq 360^\circ$ for which $\sin x = \frac{\sqrt{2}}{2}$.

Since $\sin x = \frac{\sqrt{2}}{2}$

$x = 45^\circ$ in I and II

so $x = 45^\circ$ and $x = 135^\circ$

6. Determine the equations of the vertical and horizontal asymptotes, if any, of

$g(x) = \frac{x^2}{x^2+x} = \frac{x^2}{x(x+1)}$

vertical
 $x^2+x=0$
 $x(x+1)=0$
 $x=0$ $x+1=0$
 $x=-1$

Not Asymptote

horizontal
 $y = \frac{x^2}{x^2} = \frac{1}{1} = 1$
 $\frac{x^2}{x^2} + \frac{1}{x^2} = 1 + \frac{1}{x^2} = 1+0 = 1$
 $y=1$

7. Find the value of $\begin{vmatrix} -2 & 4 & -1 \\ 1 & -1 & 0 \\ -3 & 4 & 5 \end{vmatrix} = -2 \begin{vmatrix} -1 & 0 \\ 4 & 5 \end{vmatrix} - 4 \begin{vmatrix} 1 & 0 \\ -3 & 5 \end{vmatrix} - 1 \begin{vmatrix} 1 & -1 \\ -3 & 4 \end{vmatrix}$
 $= -2(-5) - 4(5) - 1(1)$
 $= 10 - 20 - 1$
 $= -11$

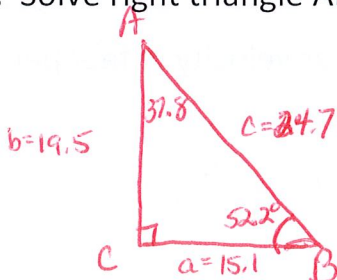
8. Determine the angular velocity if 84 revolutions are completed in 6 seconds.

$\omega = \frac{\theta}{t} = \frac{84 \text{ rev} \left(\frac{2\pi \text{ rad}}{1 \text{ rev}} \right)}{6 \text{ sec}} \approx 87.96 \text{ rad/sec}$
 or
 $28\pi \text{ rad/sec}$

9. Given a central angle of 73° , find the length of the intercepted arc in a circle of radius 9 inches.

$s = r\theta$
 $s = 9''(73^\circ) \left(\frac{\pi}{180^\circ} \right) \approx 11.5''$

10. Solve right triangle ABC if $a = 15.1$, $b = 19.5$, and angle C is a right angle.



$15.1^2 + 19.5^2 = c^2$
 $608.26 = c^2$
 $c = 24.7$

$\tan B = \frac{19.5}{15.1} =$

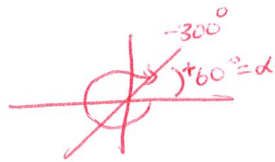
$B = 52.2^\circ$

$A = 180 - (37.8 + 52.2)$
 $A = 37.8^\circ$

11. Find $\cos\left(-\frac{5\pi}{3}\right)$

$$\cos(-300)$$

$$\cos -300 = \cos 60^\circ = \frac{1}{2}$$



12. Graph $y = \frac{x-3}{x-2}$

vertical asymptote

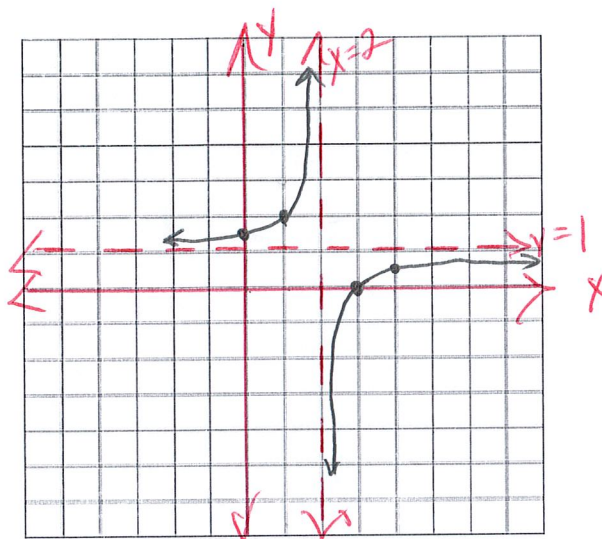
$$x-2=0$$

$$x=2$$

horizontal asymptote

$$y = \frac{\frac{x}{x} - \frac{3}{x}}{\frac{x}{x} - \frac{2}{x}} = \frac{1-0}{1-0} = \frac{1}{1} = 1$$

$$y=1$$



13. Find the value of x in the matrix equation below.

$$X = \begin{bmatrix} 1 & -5 \\ 3 & 3 \end{bmatrix} \cdot \begin{bmatrix} -3 & 8 & 5 \\ 0 & 4 & -9 \end{bmatrix} = \begin{bmatrix} \overset{-3+0}{1(-3)+(-5)(0)} & \overset{8-20}{1(8)+(-5)(4)} & \overset{5+45}{1(5)+(-5)(-9)} \\ \overset{-9+0}{3(-3)+3(0)} & \overset{24+12}{3(8)+3(4)} & \overset{15-27}{3(5)+3(-9)} \end{bmatrix}$$

$$= \begin{bmatrix} -3 & -12 & 50 \\ -9 & 36 & -12 \end{bmatrix}$$

14. Find the inverse of $\begin{bmatrix} 9 & 13 \\ 27 & 36 \end{bmatrix}$.

$$\frac{1}{\begin{vmatrix} 9 & 13 \\ 27 & 36 \end{vmatrix}} \begin{bmatrix} 36 & -13 \\ -27 & 9 \end{bmatrix} = -\frac{1}{27} \begin{bmatrix} 36 & -13 \\ -27 & 9 \end{bmatrix} \text{ or } \begin{bmatrix} -\frac{36}{27} & \frac{13}{27} \\ 1 & -\frac{9}{27} \end{bmatrix} \Rightarrow \frac{1}{3}$$

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