

(1) 10 Points. If θ is an angle in standard position whose terminal side passes through the point $(2, -5)$, find exact values for the six trigonometric functions at θ .

(2) 10 Points. Find the area of triangle ABC if $a = 420.0$ meters, $c = 360.0$ meters and $\beta = 53.86^\circ$.

(3) 10 Points. Find $f^{-1}(x)$ if $f(x) = \sqrt[3]{2x - 3}$.

(4) 10 Points.

(a) Find the reference angle for θ if $\theta = 260^\circ$.

(b) Find the angle θ if θ is an angle in standard position, the terminal side of θ is in quadrant III and the reference angle for θ is $\pi/5$. Assume that $0 \leq \theta < 2\pi$.

(5) 10 Points. Find the length of a circular arc in a circle whose radius is 14.73 meters if the arc is subtended by a central angle which measures $25^\circ 12'$.

(6) 10 Points. Use your graphing calculator to find the smallest positive solution of the equation $6 \cos x + x - 4 = 0$. The variable x is to be measured in radians, and your approximation for x should be accurate to at least 4 decimal places.

(7) 10 Points. Express $2 \sin(3x) \sin(5x)$ as a sum or difference.

(8) 10 Points. Identify each of the following conic sections by name.

(a) $4x^2 = y^2 - 6y$

(b) $x = y^2$

(c) $x^2 - 3xy - y^2 = 8$

(d) $r = \frac{3}{2 + \sin \theta}$

(e) $r = \frac{1}{1 + \cos \theta}$

(9) 10 Points. If a building which is 139 feet high casts a shadow which is 107 feet long, what is the angle of elevation of the sun?

(10) 10 Points. For the function $y = -3\cos(\pi x)$, find the amplitude and the period. Graph the equation on the graph paper below, showing at least two periods. Mark scales on the axes. You should be able to do this problem without your calculator, but you may use your calculator to check your graph.

amplitude =

period =

(11) 10 Points. Find parametric equations for an object that moves clockwise along the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ if it begins at the point $(0, 3)$ and requires 4 seconds for a complete revolution.

(12) 15 Points. Solve triangle ABC if $a = 49.50$ miles, $b = 33.40$ miles, and $c = 23.70$ miles.

(13) 15 Points. Use your calculator to approximate the following. Assume that all arguments of functions are measured values and round appropriately. When the value is an angle, express it in radian measure.

(a) $\cos(71.3^\circ)$

(b) $\tan(2.419)$

(c) $\csc(0.473)$

(d) $\sin^{-1}(0.4763)$

(e) $\sec^{-1}(2.4317)$

(14) 15 Points. Given that $\pi/2 < \theta < \pi$ and $\tan \theta = -4/3$, find exact values for the following:

(a) $\cos(\theta - \frac{5\pi}{6})$ (b) $\cos(2\theta)$ (c) $\sin(\theta + \cos^{-1}(\frac{1}{2}))$

(15) 15 Points. On the graph paper below, sketch a graph of the equation $\frac{(x+2)^2}{9} + \frac{(y-3)^2}{16} = 1$.

Find coordinates for the center:

Find coordinates for all of the vertices:

Find coordinates for both foci:

Find the eccentricity:

Find equations for both directrices:

(16) 15 Points.

(a) State the reciprocal identities.

(b) State the quotient identities.

(c) State the Pythagorean identities.

(d) Use these identities to simplify the following expression: $\frac{\cos \phi}{1 - \sin \phi} + \frac{\cos \phi}{1 + \sin \phi}$

(17) 15 Points. For this problem, consider the conic section which has equation $7x^2 - 6xy + 7y^2 = 40$.

(a) Identify this conic section by name.

(b) Determine the appropriate rotation formulas to use in part (c) below so that the new equation will contain no $x'y'$ term.

(c) Calculate an equation for this conic section which has no $x'y'$ term in the rotated $x'y'$ coordinate system.