Fifth Project Assessment

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1 Section 5.1

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Problem 1: Find the distance between (5,3) and (-1,-5).

$8^2 + 6^2 = 100$ Answer: Distance $= 100$
This problem was easy to do because it's just using Pythagoras Theorem so I didn't have too much trouble solving this.

Problem 3: Write an equation of the circle centered at (8,-10) with radius 8.

$8^2 = \sqrt{(x-8)^2 + (y+10)^2}$
Answer: $64 = (x-8)^2 + (y+10)^2$
This problem was weird at first but I was able to figure it out after reviewing the examples.

Problem 5: Write an equation of the circle centered at (7,-2) that passes through (-10,0).

$r^2 = (x-h)^2 + (y-k)^2$

$r^2 = (-10-7)^2 + (0+2)^2$

$r^2 = -17^2 + 2^2$

$r^2 = 289 + 4$

Answer: $r = 17.11$
Problem 5 was quite easy since it was replacing variables with numbers then using Pythagoras Theorem.

Problem 7: Write an equation for a circle where the points (2, 6) and (8, 10) lie along a diameter.

d = $\sqrt{(8-2)^2+(10-6)^2}$

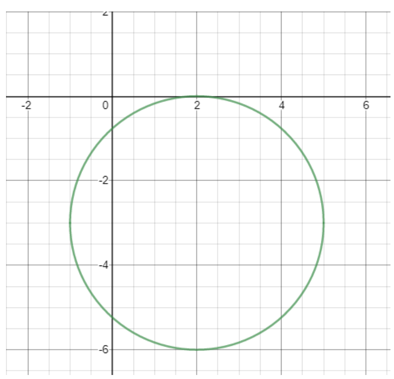
d = $\sqrt{6^2+4^2}$

d = $\sqrt{52}$

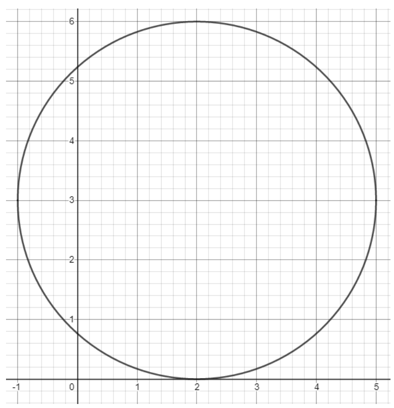
Answer: d = 7.21

This problem was easy since it's just finding the slope, radius and then solving for the diameter.

Problem 9: Sketch a graph of $(x-2)^2+(y+3)^2=9$.



Problem 11: Find the y intercept(s) of the circle with center (2,3) with radius 3.

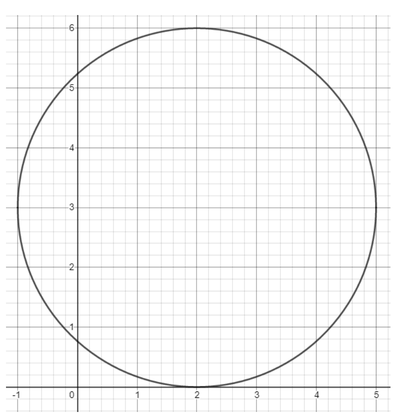


Answer: y-intercepts $= (0, 3 + -\sqrt{5})$

Problem 13: At what point in the first quadrant does the line with equation y x = + 2 5 intersect a circle with radius 3 and center (0, 5)?
$x^2 + ((2x + 5) - 5)^2 = 9$

$x^2 + 2x^2 + 9$

$5x^2 = 9$



Answer: x = $\sqrt{9/5}$
This was and easy question as well. After reviewing how to do it and drawing a picture the answer was easy to get.

Problem 17: A small radio transmitter broadcasts in a 53 mile radius. If you drive along a straight line from a city 70 miles north of the transmitter to a second city 74 miles east of the transmitter, during how much of the drive will you pick up a signal from the transmitter?

$x^2 + y^2 = 53^2$

$(\frac{-35}{37}x - 74) = (\frac{-35}{37}x + 70 = y$

$y = -0.95x + 70$

$x^2 + (-0.95x + 70)^2 = 53^2$

$x^2 + 0.89x^2 - 132.43 + 4900 = 2809$

$x^2 + 0.89x^2 - 132.43x + 2091 = 0$

x 24.1 and x 45.79

d = $\sqrt{(45.7924.1)^2 + (26.6847.2)^2} = x$ 29.86

Answer: 29.86 miles
I had some difficulty doing this problem but I was able to get the hang of it after having a classmate help me understand better.

(For the rest of the Sections I used a Scientific Calculator so it was hard to explain and show what I did since all I did was plug the problem in to it and got the answer.)

2 Section 5.2

Problem 5: Convert the angle $\frac{5Pi}{6}$ from radians to degrees

$(\frac{5Pi}{6})(\frac{180degrees}{Pi} = 150degrees$
Answer: 150 degrees
this easy was easy because all it is breaking down the problem and converting to a degree.

Problem 11: Find the angle between 0 and 2Pi in radians that is co-terminal with the angle $\frac{26Pi}{9}$.

$(\frac{26Pi}{9} - 2Pi) = \frac{26Pi}{9} - \frac{18Pi}{9} = \frac{8Pi}{9}$

Answer: $\frac{8Pi}{9}$
This was an easy question since all I had to do was subtract the fractions with similar denominators.

Problem 15: On a circle of radius 7 miles, find the length of the arc that subtends a central angle of 5 radians

r = 7m,
O = 5 rad
s = Or
s = (7m)(5) = 35m
Answer: length = 35m
This was just some basic multiplication so it was easy to do

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problem 25: A truck with 32-in.-diameter wheels is traveling at 60 mi/h. Find the angular speed of the wheels in rad/min. How many revolutions per minute do the wheels make?

D = 32
S = 60
60 miles per hour = 1 mile per minute
1 mile per hour = 63360 inches per minute
v = 63360
$v = \frac{S}{t}$
$v = \frac{63360}{16}$
v = 3960
$rotations = \frac{3960}{2Pi}$
Answer: 630.25 rotations per minute
This was easy because it's a simple version of some physics problems I had in high school

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Problem 31: You are standing on the equator of the Earth (radius 3960 miles). What is your linear and angular speed?

r = 3960

$w = \frac{O}{t}$
$w = \frac{2Pi}{24} = \frac{Pi}{12}$
v = rw
$V = (\frac{Pi}{12})(3960)$
Answer: v = 1036.27 miles per hour

This I had some trouble with but I was able to get a good understanding to do the problem.

3 Section 5.3

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Problem 1:Find the quadrant in which the terminal point determined by t lies if:
a. sin(t) < 0 and cos(t) < 0
b. sin(t) > 0 and cos(t) < 0
Answer A: They are both negative in quadrant III

Answer B: The point resides in quadrant II

Problem 3: The point P is on the unit circle. If the y-coordinate of P is $\frac{3}{5}$ and P is in quadrant II, find the x coordinate.

sin = $\frac{3}{5}$
sin + cos = 1
$\frac{25}{25} - \frac{9}{25} = \frac{16}{25}$
cos = + − $\frac{4}{5}$
Answer: $\frac{-4}{5}$

If cos(O) = $\frac{1}{7}$ and O is in the 4th quadrant, find sin(O)
cos(O) = $\frac{1}{49}$
sin(O) + $\frac{1}{49}$ = 1
sin(O) = $\frac{\sqrt{48}}{7}$

Answer: $\frac{4\sqrt{3}}{-7}$

Problem 7: If sin(O) = $\frac{3}{8}$ and O is in the 2nd quadrant, find cos(O).

$sin^2(O) = \frac{3}{8}$
$\frac{64}{64} - \frac{9}{64} = \frac{55}{64}$

Answer: cos(O) = $\frac{\sqrt{55}}{-8}$

Problem 11: For each of the following angles, find the reference angle and which quadrant the angle lies in. Then compute sine and cosine of the angle. A. $\frac{5Pi}{4}$ B.$\frac{7Pi}{6}$ C.$\frac{5Pi}{3}$ D.$\frac{3Pi}{4}$

Answers:

A. Reference angle is$\frac{Pi}{4}$, Quadrant III, $sin(\frac{5Pi}{4} = \frac{\sqrt{Pi}}{-4}$, $cos(\frac{5Pi}{4} = \frac{\sqrt{2}}{-2}$

B.Reference angle is $\frac{Pi}{6}$, Quadrant III, $sin(\frac{7Pi}{6}) = \frac{-1}{2}$, $cos(\frac{7Pi}{6}) = \frac{\sqrt{3}}{-2}$

C. Reference angle is $\frac{Pi}{3}$, Quadrant IV, $sin(\frac{5Pi}{3}) = \frac{\sqrt{3}}{-2}$, $cos(\frac{5Pi}{3} = \frac{1}{2}$

D. Reference angle is $\frac{Pi}{4}$, Quadrant II, $sin(\frac{3Pi}{4}) = \frac{\sqrt{2}}{2}$, $cos(\frac{3Pi}{4} = \frac{\sqrt{2}}{-2}$

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Problem 13: Give exact values for sin (O) and cos(O) for each of these angles. A.$\frac{3Pi}{-4}$ B. $\frac{23Pi}{6}$ C. $\frac{Pi}{-2}$ D. 5Pi

Answers:

A.$sin(\frac{\sqrt{3Pi}}{-4}) = \frac{\sqrt{2}}{-2}$, $cos(\frac{\sqrt{3Pi}}{-4}) = \frac{\sqrt{2}}{-2}$

B.$sin(\frac{23Pi}{6}) = \frac{-1}{2}$, $cos(\frac{23Pi}{6}) = \frac{\sqrt{3}}{2}$

C. $sin(\frac{Pi}{-2}) = -1$, $cos(\frac{Pi}{-2}) = 0$

D. $sin(5Pi) = 0$, $cos(5Pi) = -1$

4 Section 5.4

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Problem 3: If $\frac{5Pi}{6}$ = O, find exact values for sec(O) , csc(O), tan(O), cot(O)

Answers: $sec(\frac{5Pi}{6}) = \frac{2\sqrt{3}}{-2}$, $csc(\frac{5Pi}{6}) = 2$, $tan(\frac{5Pi}{6}) = \frac{\sqrt{3}}{-3}$, $cot(\frac{5Pi}{6}) = -\sqrt{3}$

Problem 11: If $cos(\frac{1}{3}) = $ O, and O is in quadrant III, find sin(O), sec(O) , csc(O), tan(O), cot(O)

Answers: sin(O) $= \frac{-2\sqrt{2}}{3}$, sec(O) $= -3$, csc(O) $= \frac{3\sqrt{2}}{4}$, tan(O) $= 2\sqrt{2}$, cot(O) $= \frac{\sqrt{2}}{4}$

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Simplify the following to an expression involving a single trig function with no fractions

Problem 17:csc(t) tan(t)

Answer: $\frac{1}{sin(t)} x \frac{sin(t)}{cos(t)} = \frac{1}{cos(t)} = sec(t)$

Prove the identity

Problem 27: $\frac{sin^2(O)}{1+cos(O)} = 1 - cos(O)$

Answer: According to the Pythagorean identity; $\frac{sin^2(O)}{1+cos(O)} = \frac{1-cos^2(O)}{1+cos(O)}$ so cos(O) + sin(O) = 1 which equals $\frac{(1-cos(O))(1+cos(O))}{1+cos(O)}$ by factoring and $1-cos(O)$ by subtraction.

5 Section 5.5

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In the triangle below, find sin(A) ,cos(A) , tan(A) ,sec(A) ,csc(A) ,cot(A)

Problem 1:

$10^2 + 8^2 = 164 = \sqrt{164} = 2\sqrt{41}$

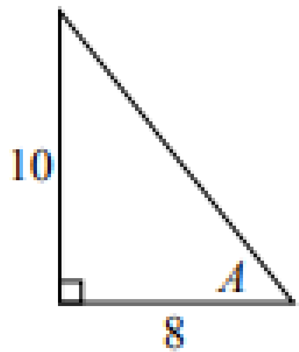
Answers:

sin(A) $= \frac{10}{2\sqrt{41}} = \frac{5}{\sqrt{41}}$

cos(A) $= \frac{8}{2\sqrt{41}} = \frac{4}{\sqrt{41}}$

tan(A) $= \frac{10}{8} = \frac{5}{4}$

sec(A) $= \frac{1}{\frac{4}{\sqrt{41}}} = \frac{\sqrt{41}}{4}$

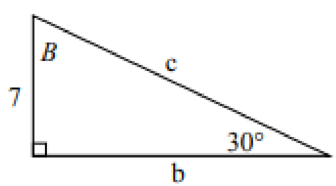


csc(A) $=\frac{1}{\frac{5}{\sqrt{41}}} = \frac{\sqrt{41}}{5}$

cot(A) $= \frac{1}{\frac{5}{4}} = \frac{4}{5}$

In the following triangle, solve for the unknown sides and angles.

Problem 3:



Answers: 90 + 30 + B = 180

Angle B = 60

sin(30) $= \frac{7}{sin(30)} = 14$
side c = 14

$7^2 + b^2 = 14^2$
$14^2 - 7^2 = b^2$
$147 = b^2$
side b = $7\sqrt{3}$

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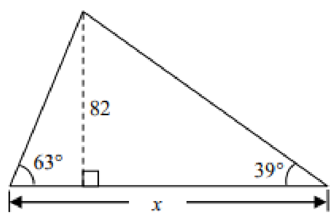
Problem 11: The angle of elevation to the top of a building in New York is found to be 9 degrees from the ground at a distance of 1 mile from the base of the building. Using this information, find the height of the building.

$\tan(9) = \frac{y}{1}$
Answer: y   836.27 ft

Problem 19:



$\tan(63) = \frac{82}{tan(63)}$
$\tan(39) = \frac{82}{tan(39)}$
$x = \frac{82}{tan(63)} + \frac{82}{tan(39)}$
Answer: x   143.03