MTH 150 Precalculus Chapter 5 Problems

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1 Chapter 5

1.1 P.343, 1-2, (Pick 1) ; P.343, 3-4, (Pick 1) ; P.343, 5-6, (Pick 1) ; P.343, 7-8, (Pick 1) ; P.343, 9-10, (Pick 1) ; P.343, 11-12, (Pick 1) ; P.343, 13-16, (Pick 1) ; P.343-345, 17-21, (Pick 1)

pg.343, #1: Find the distance between the points (5, 3) and (-1, -5).

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$D = \sqrt{[(-1) - (5)]^2 + [(-5) - (3)]^2}$$

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

$$D = \sqrt{36 + 64}; D = \sqrt{100}$$

$$D = 10 units$$

I did not struggle with distance between points problems. Once I identified the formula for a distance between 2 points, $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, all I had to do was plug in the points and simplify the expression to find the answer of 10.

pg.343, #3: Write an equation for the circle centered at (8, -10) with a radius of 8.

$$(x-h)^2+(y-k)^2=r^2$$
$$(x-8)^2+(y+10)^2=8^2$$
$$(x-8)^2+(y+10)^2=64$$

I found finding th equation of a circle given the center and the radius easy. After figuring out the formula, $(x-h)^2+(y-k)^2=r^2$, all I had to do was plug in the given radius and center into the formula and simplify it to get $(x-8)^2+(y+10)^2=64$.

pg.343, #5: Write an equation of the circle centered at (7, -2) that passes through (-10, 0).

$$(x-(7))^2+(y-(-2))^2=r^2$$
$$(x-7)^2+(y+2)^2=r^2$$
$$((-10)-7)^2+((0)+2)^2=r^2$$
$$(-17)^2+(2)^2=r^2$$
$$r^2=289+4, r^2=293$$
$$(x-7)^2+(y+2)^2=293$$

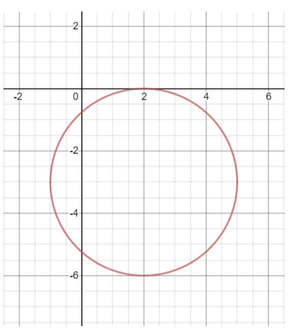
I found this problem slightly more difficult then finding the equation of a circle given its center and radius. After plugging the first given point into $(x-h)^2+(y-k)^2=r^2$, I got half of the equation, $(x-7)^2+(y+2)^2=r^2$. To find the other half, I plugged the other point into what was found as $((-10)-7)^2+((0)+2)^2=r^2$ and solved for r^2 which was $r^2=293$. Then I plugged r^2 into the half equation to get $(x-7)^2+(y+2)^2=293$ as the final equation.

pg.343, #7: Write an equation for a circle where the points (2, 6) and (8, 10) that lie along a diameter.

$$D = \sqrt{[(8) - (2)]^2 + [(10) - (6)]^2}$$
$$D = \sqrt{(6)^2 + (4)^2}$$
$$D = \sqrt{36 + 16}$$
$$D = \sqrt{52}$$
$$D = 2\sqrt{13}; r^2 = 13$$
$$(x - 5)^2 + (y - 8)^2 = 13$$

I did not struggle with finding the equation for a circle for 2 given points that lie along a diameter. I plugged the points into the distance formula, $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, to get $D = \sqrt{[(8) - (2)]^2 + [(10) - (6)]^2}$. I then simplified and used the distance solved for as the diameter. By halving the diameter I found the radius for the equation for the circle. I then plugged the radius into the equation to get $(x - 5)^2 + (y - 8)^2 = 13$.

pg.343, #9: Sketch a graph of $(x - 2)^2 + (y + 3)^2 = 9$



I found this problem very easy. I identified the given equation as an equation of a circle, and so I knew once I graphed it, it should be a perfect circle. After that, plugged the equation into desmos to graph it.

pg.343, #11: Find the y intercept(s) of the circle with a center of (2, 3) and with a radius of 3.

$$(x-2)^2+(y-3)^2=3^2$$
$$((0)-2)^2+(y-3)^2=3^2, (-2)^2+(y-3)^2=9$$
$$4+(y-3)^2=9, (y-3)^2=5$$
$$(y-3)=\pm\sqrt{5}$$
$$(y-3)=\sqrt{5}; y=\sqrt{5}+3$$
$$(y-3)=-\sqrt{5}; y=-\sqrt{5}+3$$
$$(0,3+\sqrt{5}); (0,3-\sqrt{5})$$

I did not struggle with finding the y intercepts of a circle. I started by plugging the given point into the equation for a circle to get $(x-2)^2+(y-3)^2=3^2$. I then plugged 0 in for x and solved for what y was equal to. I then took what y was equal to and put it into point format.

pg.343, #13: At what point in the first quadrant does the line with the equation $y=2x+5$ intersect a circle with a radius of 3 and a center of (0, 5)?

$$(x-0)^2+(y-5)^2=3^2, x^2+(y-5)^2=9$$
$$x^2+[(2x+5)-5]^2=9, x^2+(2x)^2=9$$
$$5x^2=9; x^2=\frac{9}{5}; x=\pm\sqrt{\frac{9}{5}}$$
$$y=2(\sqrt{\frac{9}{5}})+5$$
$$(\sqrt{\frac{9}{5}}, 2\sqrt{\frac{9}{5}}+5)$$

I found this type of problem easy. First I plugged the given point into the equation for a circle to get $(x-0)^2+(y-5)^2=3^2$ and then simplified it to $x^2+(y-5)^2=9$. I then plugged the given equation in for y as $x^2+[(2x+5)-5]^2=9$ and solved for x. After getting what x was equal to, $x=\pm\sqrt{\frac{9}{5}}$, I solved for y and put the intercepts into point format.

pg.343, #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?

$$x^2 + y^2 = 53^2$$
$$y = \frac{35}{37}(x - 74) = -\frac{35}{37}x + 70$$
$$y = -0.94595x + 70$$
$$x^2 + (-0.94595x + 70)^2 = 2809$$
$$x^2 + 0.89482x^2 - 132.43244x + 4900 = 2809$$
$$1.89482x^2 - 132.43244x + 2091 = 0$$
$$x = \frac{132.43244 \pm \sqrt{132.43244^2 - 4(1.89482)(2091)}}{2(1.89482)}$$
$$x = \frac{132.43244 \pm \sqrt{17538.351 - 15848.274}}{3.7896}$$
$$x = \frac{132.43244 \pm \sqrt{1690.0767}}{3.7896}, x = \frac{132.43244 \pm 41.11}{3.7896}$$
$$x = \frac{132.43244 + 41.11}{3.7896}; x = \frac{173.543}{3.7896}; x = 45.79$$
$$x = \frac{132.43244 - 41.11}{3.7896}; x = \frac{91.322}{3.7896}; x = 24.10$$
$$(24.01, 47.20); (45.79, 26.68)$$
$$D = \sqrt{(45.79 - 24.10)^2 + (26.68 - 47.20)^2}$$
$$D = \sqrt{(21.69)^2 + (-20.52)^2}$$
$$D = \sqrt{470.46 + 421.07}, D = \sqrt{891.53}$$

D = 29.858 miles

I struggled quite a bit with this problem. I have a tendency to not understand what word problems are asking and I had that same issue with this problem. I was able to use the solution manual to aid me through the math and to fully understand what the question was asking.

1.2 P.359, 5-6, (Pick 1) ; P.359, 11-14, (Pick 1) ; P.359-360, 15-24, (Pick 1) ; P.360-361, 25-32, (Pick 2)

pg.359, #5: Convert the angle $\frac{5\pi}{6}$ from radians to degrees.

$$\frac{5\pi}{6} X \frac{180}{\pi} = 150°$$

I did not struggle with converting radians to degrees. To do this, all I had to do was multiple the number of radians by $\frac{180}{\pi}$ to convert it into degrees, in which I got 150° after converting it.

pg.359, #11: Find the angle between 0 and 2π in radians that is coterminal with the angle $\frac{26\pi}{9}$.

$$\frac{26\pi}{9} - 2\pi$$

$$\frac{26\pi}{9} - \frac{18\pi}{9} = \frac{8\pi}{9}$$

I found finding coterminal angles between 0 and 2π to certain radians easy. To do this, I subtracted 2π from the original radians, $\frac{26\pi}{9}$. The number found by subtracting, $\frac{8\pi}{9}$, is the coterminal angle to the original radians.

pg.359, #15: On a circle of radius 7 miles, find the length of the arc that subtends a central angle of 5 radians.

$$s = \theta r$$

$$s = (7)(5) = 35$$

35 miles

I did not struggle with finding the length of the arc of a central angle of certain radians. To do this, I used the formula, $s = \theta r$, where θ is the radius of the arc and r is the number of radians in the angle. I then plugged in the given variables to get $s = (7)(5) = 35$ and simplified it to 35 miles.

pg.360, #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?

$$w = \frac{63360}{16} = 3960$$
$$\frac{3960}{2\pi} = 630.25$$

630.25 rotations/min

I struggled a lot with this problem. I am not sure how to calculate the angular speed on an object. I looked at the solution manual and followed the math, but I am unsure where they got the starting numbers that were used to compute the correct answer.

pg.360, #27: A wheel of radius 8 in. is rotating $15°/sec$. What is the linear speed v, the angular speed in RPM, and the angular speed in rad/sec?

$$v = wr$$
$$v = (\frac{\pi}{12})(8) = 2.094$$
$$\frac{2.094}{8} = 0.26175$$
$$0.26175X60 = 15.705$$
$$\frac{15.705}{2\pi} = 2.499$$

RPM = 2.499

I struggled a lot with this problem too. I am not quite sure what type og math this question is asking me to complete. I followed the solution manual and completed the math which made sense, I am just left unsure on where those numbers came from, and why they were used where they were.

1.3 P.373, 1-2, (Pick 1) ; P.373, 3-4, (Pick 1) ; P.373, 5-8, (Pick 2) ; P.373, 11-12, (Pick 1) ; P.374, 13-14, (Pick 1)

pg.373, #1: Find the quadrant in which the terminal point determined by t lies if

a - $sin(t)<0$ and $cos(t)<0$
Quadrant III
b - $sin(t)>0$ and $cos(t)<0$
Quadrant II

I found determining the quadrant of a terminal point not too difficult. After determining the section of the unit circle that fits the given qualifications, I could determine which quadrant those sections fall under.

pg.373, #3: The point P is on the unit circle. If the y-coordinate of P is 3/5, and P is in quadrant II, find the x coordinate.

$$Sin^2\theta + Cos^2\theta = 1$$

$$Sin\theta = \frac{3}{5}, \frac{9}{25} + Cos^2\theta = 1$$

$$Cos^2\theta = \frac{25}{25} - \frac{9}{25}$$

$$Cos^2\theta = \frac{16}{25}, Cos\theta = \pm\frac{4}{5}$$

$$x = -\frac{4}{5}$$

I did not struggle with finding the x coordinate of a point on the unit circle. To do this, I used the base formula, $Sin^2\theta + Cos^2\theta = 1$, and plugged the y coordinate 3/5 in for $Sin(\theta)$ to get $\frac{9}{25} + Cos^2\theta = 1$. I then solved for $Cos(\theta)$ which came out to -4/5, which is equal to the x coordinate of the point.

pg.373, #5:If $Cos(\theta) = \frac{1}{7}$ and θ are in the 4th quadrant, find $Sin(\theta)$.

$$Sin^2\theta + Cos^2\theta = 1$$
$$Sin^2\theta + \frac{1}{49} = 1, Sin^2\theta = \frac{49}{49} - \frac{1}{49}$$
$$Sin^2\theta = \frac{48}{49}, Sin\theta = \pm\frac{\sqrt{48}}{7} = \frac{-4\sqrt{3}}{7}$$
$$Sin\theta = \frac{-4\sqrt{3}}{7}$$

I did not struggle with finding the $Sin(\theta)$ when given the $Cos(\theta)$ and quadrant. To do this, I used the base formula, $Sin^2\theta + Cos^2\theta = 1$, and plugged in $Cos(\theta)$, 1/7, as $Sin^2\theta + \frac{1}{49} = 1$ and then solved for $Sin(\theta)$ by simplifying. After simplifying, I got $Sin\theta = \frac{-4\sqrt{3}}{7}$.

pg.373, #7: If $Sin(\theta) = \frac{3}{8}$ and θ are in the 2nd quadrant, find $Cos(\theta)$.

$$Sin^2\theta + Cos^2\theta = 1$$
$$\frac{9}{64} + Cos^2\theta = 1, Cos^2\theta = \frac{64}{64} - \frac{9}{64}$$
$$Cos^2\theta = \frac{55}{64}, Cos\theta = \pm\frac{\sqrt{55}}{8}$$
$$Cos\theta = -\frac{\sqrt{55}}{8}$$

I found this problem very easy. I used the base formula, $Sin^2\theta + Cos^2\theta = 1$, and plugged in the given $Sin(\theta)$, 3/8, to get $\frac{9}{64} + Cos^2\theta = 1$. I then solved for $Cos(\theta)$ by simplifying the equation to get $Cos\theta = -\frac{\sqrt{55}}{8}$.

pg.373, #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 - $\frac{5\pi}{4}$

$$\frac{5\pi}{4} = \pi + \frac{\pi}{4}$$

Reference Angle = $\frac{\pi}{4}$
Quadrant = III

$$Sin(\frac{5\pi}{4}) = -Sin(\frac{\pi}{4}) = -\frac{\sqrt{2}}{2}$$

$$Sin(\frac{5\pi}{4}) = -\frac{\sqrt{2}}{2}$$

$$Cos(\frac{5\pi}{4}) = -Cos(\frac{\pi}{4}) = -\frac{\sqrt{2}}{2}$$

$$Cos(\frac{5\pi}{4}) = -\frac{\sqrt{2}}{2}$$

b - $\frac{7\pi}{6}$

$$\frac{7\pi}{6} = \pi + \frac{\pi}{6}$$

Reference Angle = $\frac{\pi}{6}$
Quadrant = III

$$Sin(\frac{7\pi}{6}) = -Sin(\frac{\pi}{6}) = -\frac{1}{2}$$

$$Sin(\frac{7\pi}{6}) = -\frac{1}{2}$$

$$Cos(\frac{7\pi}{6}) = -Cos(\frac{\pi}{6}) = -\frac{\sqrt{3}}{2}$$

$$Cos(\frac{7\pi}{6}) = -\frac{\sqrt{3}}{2}$$

c - $\frac{5\pi}{3}$

$$\frac{5\pi}{3} = \pi + \frac{\pi}{3}$$

Reference Angle = $\frac{\pi}{3}$
Quadrant = IV

$$Sin(\frac{5\pi}{3}) = -Sin(\frac{\pi}{3}) = -\frac{\sqrt{3}}{2}$$

$$Sin(\frac{5\pi}{3}) = -\frac{\sqrt{3}}{2}$$

$$Cos(\frac{5\pi}{3}) = -Cos(\frac{\pi}{3}) = \frac{1}{2}$$

$$Cos(\frac{5\pi}{3}) = \frac{1}{2}$$

d - $\frac{3\pi}{4}$

$$\frac{3\pi}{4} = \pi + \frac{\pi}{4}$$

Reference Angle = $\frac{\pi}{4}$
Quadrant = II

$$Sin(\frac{3\pi}{4}) = -Sin(\frac{\pi}{4}) = \frac{\sqrt{2}}{2}$$

$$Sin(\frac{3\pi}{4}) = \frac{\sqrt{2}}{2}$$

$$Cos(\frac{3\pi}{4}) = -Cos(\frac{\pi}{4}) = -\frac{\sqrt{2}}{2}$$

$$Cos(\frac{3\pi}{4}) = -\frac{\sqrt{2}}{2}$$

I did not struggle with finding the reference angle, quadrant, sine, and cosine of the given angles. To find the reference angle, take the original angle and subtract π. What ever is left over is the reference angle. To find the quadrant of an angle, I referred to the unit circle and compared the angle to that. To find the sine and cosines of the given angles, I found the negative sine and cosine of the reference angle of the given angle.

pg.374, #13: Give exact values for $Sin\theta$ and $Cos\theta$ for each of these angles.

a - $-\frac{3\pi}{4}$

$$Sin(-\frac{3\pi}{4}) = -Sin(\frac{\pi}{4}) = -\frac{\sqrt{2}}{2}$$

$$Sin(-\frac{3\pi}{4}) = -\frac{\sqrt{2}}{2}$$

$$Cos(-\frac{3\pi}{4}) = -Cos(\frac{\pi}{4}) = -\frac{\sqrt{2}}{2}$$

$$Cos(-\frac{3\pi}{4}) = -\frac{\sqrt{2}}{2}$$

b - $\frac{23\pi}{6}$

$$Sin(\frac{23\pi}{6}) = -Sin(\frac{\pi}{6}) = -\frac{1}{2}$$

$$Sin(\frac{23\pi}{6}) = -\frac{1}{2}$$

$$Cos(\frac{23\pi}{6}) = -Cos(\frac{\pi}{6}) = \frac{\sqrt{3}}{2}$$

$$Cos(\frac{23\pi}{6}) = \frac{\sqrt{3}}{2}$$

c - $-\frac{\pi}{2}$

$$y = -1, x = 0$$

$$Sin(-\frac{\pi}{2}) = \frac{y}{1} = -1$$

$$Sin(-\frac{\pi}{2}) = -1$$

$$Cos(-\frac{\pi}{2}) = \frac{x}{1} = 0$$

$$Cos(-\frac{\pi}{2}) = 0$$

d - 5π

$$Sin(5\pi) = Sin(\pi) = 0$$

$$Sin(5\pi) = 0$$

$$Cos(5\pi) = Cos(\pi) = -1$$

$$Cos(5\pi) = -1$$

I found that finding the exact values of $Sin()$ and $Cos(\theta)$ given the angle easy. I found the reference angle for each of the given angles and then plugged them in as θ for $Sin()$ and $Cos(\theta)$. I then simplified the equations to get what $Sin()$ and $Cos(\theta)$ were equal to for each given angle.

1.4 P.382, 1-6, (Pick 1) ; P.382, 9-14, (Pick 1) ; P.383, 17-26, (Pick 1) ; P.384, 27-38, (Pick 1)

pg.382, #1: If $\theta = \frac{\pi}{4}$, than find the exact values for $Sec(\theta)$, $Csc(\theta)$, $Tan(\theta)$, and $Cot(\theta)$.

$$Sec(\frac{\pi}{4}) = \frac{1}{Cos(\frac{\pi}{4})} = \frac{1}{\frac{\sqrt{2}}{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}, Sec(\frac{\pi}{4}) = \sqrt{2}$$

$$Csc(\frac{\pi}{4}) = \frac{1}{Sin(\frac{\pi}{4})} = \frac{1}{\frac{\sqrt{2}}{2}} = \frac{2}{\sqrt{2}} = \sqrt{2}, Csc(\frac{\pi}{4}) = \sqrt{2}$$

$$Tan(\frac{\pi}{4}) = \frac{Sin(\frac{\pi}{4})}{Cos(\frac{\pi}{4})} = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1, Tan(\frac{\pi}{4}) = 1$$

$$Cot(\frac{\pi}{4}) = \frac{1}{Tan(\frac{\pi}{4})} = 1, Cot(\frac{\pi}{4}) = 1$$

I did not struggle with finding the exact values of $Sec(\theta)$, $Csc(\theta)$, $Tan(\theta)$, and $Cot(\theta)$ given what θ is equal to. To find $Sec(\frac{\pi}{4})$, I took the inverse of $Cos(\frac{\pi}{4})$ and simplified it. To find $Csc(\frac{\pi}{4})$, I took the inverse of $Sin(\frac{\pi}{4})$ and simplified it. To find $Tan(\frac{\pi}{4})$, I divided $Sin(\frac{\pi}{4})$ by $Cos(\frac{\pi}{4})$ and simplified it. To find $Cot(\frac{\pi}{4})$, I took the inverse of $Tan(\frac{\pi}{4})$ and simplified it.

pg.382, #9: If $Sin\theta = \frac{3}{4}$ and θ is in Quadrant II, than find the exact values for $Cos(\theta)$, $Sec(\theta)$, $Csc(\theta)$, $Tan(\theta)$, and $Cot(\theta)$.

$$Cos(\theta) = -\sqrt{1 - Sin^2(\theta)} = -\sqrt{1 - (\frac{3}{4})^2} = -\frac{\sqrt{7}}{4}$$

$$Cos(\theta) = -\frac{\sqrt{7}}{4}$$

$$Sec(\theta) = \frac{1}{Cos(\theta)} = \frac{1}{-\frac{\sqrt{7}}{4}} = \frac{-4\sqrt{7}}{4}$$

$$Sec(\theta) = \frac{-4\sqrt{7}}{4}$$

$$Csc(\theta) = \frac{1}{Sin(\theta)} = \frac{\frac{1}{3}}{4} = \frac{4}{3}$$

$$Csc(\theta) = \frac{4}{3}$$

$$Tan(\theta) = \frac{Sin(\theta)}{Cos(\theta)} = \frac{\frac{3}{4}}{\frac{\sqrt{7}}{4}} = \frac{-3\sqrt{7}}{7}$$

$$Tan(\theta) = \frac{-3\sqrt{7}}{7}$$

$$Cot(\theta) = \frac{1}{Tan(\theta)} = \frac{1}{\frac{-3\sqrt{7}}{7}} = \frac{7}{-3\sqrt{7}} = \frac{\sqrt{7}}{3}$$

$$Cot(\theta) = \frac{\sqrt{7}}{3}$$

I found this problem easy. Given that $Sin\theta = \frac{3}{4}$, I knew that I could use the base formula, $Sin^2\theta + Cos^2\theta = 1$, and rearranged it to solve for $Cos(\Theta)$. I then plugged in the value for $Sin(\theta)$ and solved. To find $Sec(\theta)$, I took the inverse of $Cos(\Theta)$ and simplified it. To find $Csc(\theta)$, I took the inverse of $Sin\theta$ and simplified it. To find $Tan(\theta)$, i divided $Sin(\theta)$ by $Cos(\Theta)$ and simplified. To find $Cot(\theta)$, I took the inverse of $Tan(\theta)$ and simplified it.

pg.383, #17: Simplify $Csc(t)Tan(t)$ to an expression involving a single trig function with no fractions.

$$Csc(t)Tan(t) = \frac{1}{Sin(t)} X \frac{Sin(t)}{Cos(t)} = \frac{1}{Cos(t)} = Sec(t)$$

I struggled a lot with this problem. I wasn't quite sure where to start, and so I used the solution manual in aiding me to start the problem. After looking at the solution manual, I was able to understand it a bit better and do that math, but I am still pretty confused by the problem.

pg.384, #27: Prove the identity $\frac{Sin^2(\theta)}{1+Cos(\theta)} = 1 - Cos(\theta)$.

$$\frac{Sin^2(\theta)}{1+Cos(\theta)} = \frac{1-Cos(\theta)}{1+Cos(\theta)}$$

$$Sin^2(\theta) + Cos^2(\theta) = 1 = \frac{(1+Cos(\theta))(1-Cos(\theta))}{1+Cos(\theta)} = 1 - Cos(\theta)$$

I struggled a lot with this problem too. I wasn't sure how to prove an identity, and so I referred to the solution manual to help me understand. The math in the solution manual makes sense and I understand that, I just wasn't sure how to start the problem.

1.5 P.391, 1-2, (Pick 1) ; P.391, 3-8, (Pick 1) ; P.391-392, 9-18, (Pick 1) ; P.392-393, 19-22, (Pick 1) ; P.393-394, 23-26, (Pick 1)

pg.391, #1: In the triangle, find Sin(A), Cos(A), Tan(A), Sec(A), Csc(A), Cot(A).

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

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

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

$$Cos(A) = \frac{8}{2\sqrt{41}} = \frac{4}{\sqrt{41}}$$
$$Cos(A) = \frac{4}{\sqrt{41}}$$
$$Tan(A) = \frac{10}{8} = \frac{5}{4}$$
$$Tan(A) = \frac{5}{4}$$
$$Sec(A) = \frac{1}{Cos(A)} = \frac{1}{\frac{4}{\sqrt{41}}} = \frac{\sqrt{41}}{4}$$
$$Sec(A) = \frac{\sqrt{41}}{4}$$
$$Csc(A) = \frac{1}{Sin(A)} = \frac{1}{\frac{5}{\sqrt{41}}} = \frac{\sqrt{41}}{5}$$
$$Csc(A) = \frac{\sqrt{41}}{5}$$
$$Cot(A) = \frac{1}{Tan(A)} = \frac{1}{\frac{5}{4}} = \frac{4}{5}$$
$$Cot(A) = \frac{4}{5}$$

I did not struggle with this problem. To start, I found what the hypotenuse length of the triangle was using the Pythagorean theorem. To find Sin(A), I took the opposite side of the triangle and divided it by the hypotenuse, $Sin(A) = \frac{10}{2\sqrt{41}} = \frac{5}{\sqrt{41}}$, and simplified it. To find Cos(A), I took the adjacent side of the triangle and divided it by the hypotenuse, $Cos(A) = \frac{8}{2\sqrt{41}} = \frac{4}{\sqrt{41}}$, and simplified it. To find Tan(A), I took the opposite side of the triangle, and divided it by the adjacent side, $Tan(A) = \frac{10}{8} = \frac{5}{4}$, and simplified it. To find Sec(A), I took the inverse of Cos(A) and simplified it. To find Csc(A), I took the inverse of Sin(A) and simplified it. To find Cot(A), I took the inverse of Tan(A), and simplified it.

pg.391, #3: For the triangle, solve for the unknown sides and angles.

$$Sin(30°) = \frac{7}{c}$$
$$c = \frac{7}{Sin(30°)} = \frac{7}{\frac{1}{2}} = 14$$
$$c = 14$$
$$Tan(30°) = \frac{7}{b}$$
$$b = \frac{7}{Tan(30°)} = \frac{7}{\frac{1}{\sqrt{3}}} = 7\sqrt{3}$$
$$b = 7\sqrt{3}$$
$$Sin(B) = \frac{b}{c} = \frac{7\sqrt{3}}{14} = \frac{\sqrt{3}}{2} = 60°$$
$$B = 60°$$

I found finding the unknown sides and angles of a triangle easy. First I found what the c side was equal to using $Sin(30°)$, and dividing 7 by it, $c = \frac{7}{Sin(30°)} = \frac{7}{\frac{1}{2}} = 14$. I then found what the b side of triangle was equal to using same method, but by diving 7 by $Tan(30°)$. I then found B angle by dividing the c side by the b side, $Sin(B) = \frac{b}{c} = \frac{7\sqrt{3}}{14} = \frac{\sqrt{3}}{2} = 60°$.

pg.391, #9: A 33-ft ladder leans against a building so that the angle between the ground and the ladder is 80°. How high does the ladder reach up the side of the building?

$$Sin(80°) = \frac{x}{33}$$
$$x = 33Sin80°$$
$$x = 32.499ft$$

I did not struggle with this problem. By being provided the degree of the angle and the hypotenuse of the ladder, I could simply solve the problem by using $Sin(80°) = \frac{x}{33}$ and simplifying to get what x was equal to. What x was equal to is how tall the building would be.

pg.392, #19: Find the length of x.

$$tan(63°) = \frac{82}{a}$$

$$a = \frac{82}{tan(63°)}$$

$$tan(39°) = \frac{82}{b}$$

$$b = \frac{82}{tan(39°)}$$

$$x = (\frac{82}{tan(63°)}) + (\frac{82}{tan(39°)}) = 143.043$$

$$x = 143.043$$

I did not struggle with finding the length of x in the given triangle. To start, I had to find the individual lengths of each of segments for the base of the triangle. To find length a I used $tan(63°) = \frac{82}{a}$ and simplified. To find length b I used $b = \frac{82}{tan(39°)}$ and simplified. After finding lengths a and b I added them together to get the length of x, $x = 143.043$.

pg.393, #23: A plane is flying 2000 feet above sea level toward a mountain. The pilot observes the top of the mountain to be 18° above the horizontal, then immediately flies the plane at an angle of 20° above horizontal. The airspeed of the plane is 100 mph. After 5 minutes, the plane is directly above the top of the mountain. How high is the plane above the top of the mountain (when it passes over)? What is the height of the mountain? [UW]

$$PT = (\frac{100}{1})(\frac{1}{60})(5) = \frac{25}{3} = 44000$$

$$Sin(20°) = \frac{TL}{PT}; TL = PT(Sin(20°)) = 44000Sin(20°)$$

$$Cos(20°) = \frac{PL}{PT}; PL = PT(Cos(20°)) = 44000Cos(20°)$$

$$Tan(18°) = \frac{EL}{PL}; EL = PL(Tan(18°)) = 44000Cos(20°)tan(18°) = 13434.2842$$

$$TE = TL - EL; 44000Sin(20°) - 44000Cos(20°)Tan(18°)$$
$$= 44000[Sin(20°) - Cos(20°)Tan(18°)] = 1614.6021ft$$

1614.6021ft above the top of the mountain

$$13434.2842 + 2000 = 15434.2842$$

The mountain is 15434.2842ft tall.

I struggled a lot with this problem. I have an issue with interpreting the meaning of word problems and what they are asking. I used the solution manual to help me understand what to do math wise, and I was able to figure out that part. However, I am still left confused on the wording of the problem and how it translates to the math I had done.