Precalculus-04, Minitest 4 Review Key

Dr. Graham-Squire, Fall 2013

•Some practice problems to work on:

1. Without a calculator, find the exact value of the following. If an expression does not exist, write DNE and explain why it does not exist.

   (a) $\sin^{-1}(-\frac{\sqrt{2}}{2}) = \frac{-\pi}{4}$

   (b) $\cos^{-1}(1) = 0$

   (c) $\tan^{-1}(1) = \frac{\pi}{4}$

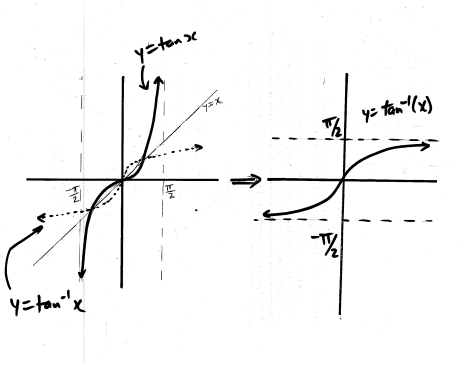
   (d) $\cos^{-1}(\frac{\pi}{2}) =$ DNE because $\frac{\pi}{2} > 1$

   (e) $\tan^{-1}(-\sqrt{3}) = \frac{-\pi}{3}$

   (f) $\tan^{-1}(\tan\left(\frac{4\pi}{3}\right)) = \frac{\pi}{3}$

   (g) $\tan(\sin^{-1}(1)) = \tan(\frac{\pi}{2}) =$ DNE because tangent of pi/2 is not defined (you would be dividing by zero because $\cos\frac{\pi}{2} = 0$.

2. Sketch a graph of the tangent function for x-values between $-\pi/2$ and $\pi/2$. Now draw the line $y = x$, and flip the graph of tangent over the line $y = x$ to sketch the graph of $y = \tan^{-1} x$



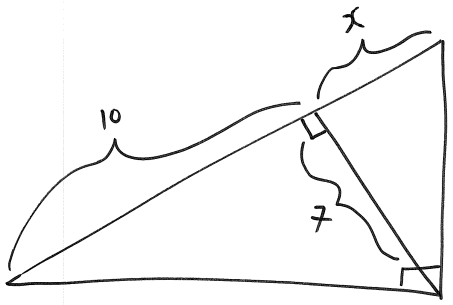
3. New York and Los Angeles are 2450 miles apart. Thinking of that distance as an arc lying on a circle, find the angle that the arc subtends at the center of the earth. (Note: you will need to use the fact that the radius of the earth is 3960 miles). Find the angle in both radians and degrees, round to the nearest 0.1.

   Ans: 0.618 radians and 35.4 degrees

4. Solve the right triangle with a hypotenuse of length 20 and one angle equal to 53°. Round to the nearest 0.1.

   Ans: the two sides are 16 and 12, and the angle is 37 degrees.

5. Solve for x. Round to the nearest 0.1.



Ans: You have to first use the sides 7 and 10 to set up an equation such as $\tan\theta = \frac{7}{10}$, then use the inverse tangent to find the value of the angle θ. Use that angle to find the other angle in the big triangle, then use tangent to solve for $x = 4.9$.

6. A plane is flying at an elevation of 5000 feet, directly above a straight highway. Two cars are on the highway on opposite sides of the plane. The angle of depression to one car is $35°$ and the angle of depression to the other car is $48°$. How far apart are the cars? Round to the nearest 0.1 feet.

   Ans: 11642.7

7. Write $\sec\theta$ in terms of $\sin\theta$, assuming θ is in Quadrant 2.

   Ans: $\dfrac{1}{-\sqrt{1-\sin^2\theta}}$

8. Find the exact value of $\sin(\tan^{-1}\dfrac{11}{8})$, without using a calculator. Then write it as a decimal number and compare to what you get on a calculator.

   Ans: $11/\sqrt{185}$, or 0.8087 in decimal form.

9. A tower has a height of 1380 feet, and it is casting a shadow of length 2000 feet. What is the angle of elevation of the sun at that moment?

   Ans: 34.6 degrees.