

**Quiz 9 Solutions**

MAC 1147.3881, Fall 2015  
 Thursday, November 19, 2015

Show all relevant work to support your answer. A correct answer without supporting work will not earn the points. **Problems 3 and 4 are on the back.**

1. (1 point) What's your favorite quote (i.e from a movie, book, etc.)? (Hint: There is no wrong answer)

**Solution:** Answers vary, but the most acceptable is:  
 "The first rule of Fight Club is: you do not talk about Fight Club."

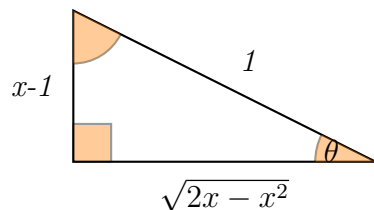
2. (4 points) Evaluate the inverse trigonometric expressions:  
 (a)  $\arccos(\frac{1}{2})$

**Solution:** The above statement translates to finding  $\theta$  in the statement  $\cos \theta = \frac{1}{2}$ . This occurs when  $\theta = \frac{\pi}{3}$  or  $60^\circ$ .

Note, we used the fact that the range of  $\arccos x$  is  $[0, \pi]$ , which is the domain of the restricted cosine function. This is why we specifically chose  $\frac{\pi}{3}$  as the solution.

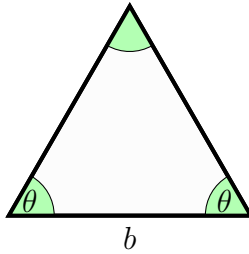
- (b)  $\sec[\arcsin(x - 1)]$

**Solution:** If we let  $\arcsin(x - 1) = \theta$ , then  $\sin \theta = x - 1$  (after taking sin of both sides). Hence we get the following diagram:



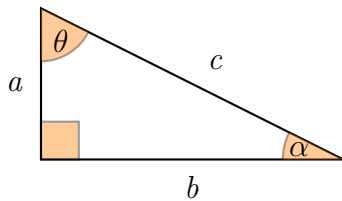
Now since we let  $\arcsin(x - 1) = \theta$ , our problem translates to finding  $\sec \theta$  using our triangle. Hence,  $\sec \theta = \frac{1}{\sqrt{2x-x^2}}$ .

3. (2 points) Find the altitude of the triangle shown below given that  $\theta = 18^\circ$  and  $b = 10$ .



**Solution:** First, draw a line from the top of the triangle to the midpoint of the base of the triangle. The length of this segment, denote by  $a$ , is the altitude. In short, we have divided the triangle into two right triangles. The measure of the base of each right triangle will be  $10/2 = 5$ . Thus, using the identity  $\tan(18^\circ) = \frac{a}{5}$ , we see  $a = 5 \tan(18^\circ)$ .

4. (3 points) Given  $\alpha = 30^\circ$  and  $b = 3$ , find the remaining sides and angles.



**Solution:** First, since  $\alpha = 30^\circ$  and we are looking at a right triangle, then  $\alpha + 30^\circ + 90^\circ = 180^\circ$ , and so  $\alpha = 60^\circ$ .

Next, we use trig identities to find the missing sides. Hence  $\tan(30^\circ) = \frac{a}{3}$ , or  $\frac{\sqrt{3}}{3} = \frac{a}{3}$ . So we see  $a = \sqrt{3}$ . Lastly, use the identity  $\cos(30^\circ) = \frac{3}{c}$ , or  $\frac{\sqrt{3}}{2} = \frac{3}{c}$ . Then  $c = 2\sqrt{3}$ .