Test #2 Review Questions – Math 3

I will provide the identity sheet for your use with this test. Again, you should be able to do most of these by hand (with a few exceptions in the trigonometric equations). Any questions that ask for an “exact answer” means that you need to leave any radicals or pi in the answer – no decimals!

1) Find all of the solutions of \( \sin^2 u - 5\sin u + 4 = 0 \)

2) Find exact values of the following, if they are defined:
   a) \( \sin^{-1}(\sin \frac{2\pi}{3}) \)  
   b) \( \cos^{-1}(\cos \frac{4\pi}{3}) \)  
   c) \( \tan^{-1}(\tan \frac{7\pi}{6}) \)
   d) \( \cot(\sin^{-1} \frac{-2}{5}) \)  
   e) \( \sec(\tan^{-1} \frac{7}{4}) \)  
   f) \( \csc(\cos^{-1} \frac{1}{5}) \)

3) Rewrite the expression in terms of \( x \) (eliminate the trig functions):
   \( \tan(\arccos x) \)

4) Solve \( \tan^2 x + 2 \tan x - 4 = 0 \) where \( x \) is in the interval \( (-\frac{\pi}{2}, \frac{\pi}{2}) \).

5) Verify the following identity: \( \frac{\tan x}{1 + \sec x} + \frac{1 + \sec x}{\tan x} = 2 \csc x \).

6-7. Find all of the solutions of the following equations.
   6) \( \cot x = -\frac{1}{\sqrt{3}} \)
   7) \( \cos(4x - \frac{\pi}{4}) = \frac{\sqrt{2}}{2} \)

8) Find all of the solutions of \( 2\sin^3 x + \sin^2 x - 2\sin x - 1 = 0 \) on the interval \([0, 2\pi]\).

9) Find the exact values of the following:
   a) \( \cos 135^\circ - \cos 60^\circ \)  
   b) \( \cos 75^\circ \)

10) If \( x \) and \( y \) are third-quadrant angles such that \( \cos x = -2/5 \) and \( \cos y = -3/5 \), find the exact value of the following:
   a) \( \cos(x - y) \)  
   b) \( \sin(x - y) \)  
   c) the quadrant containing \( x - y \)

11) Find the exact values of \( \sin 2x, \cos 2x, \) and \( \tan 2x \) given that \( \sin x = -\frac{4}{5}, 270^\circ < x < 360^\circ \).

12) Find the exact values of \( \sin(x/2), \cos(x/2), \) and \( \tan(x/2) \) given that \( \csc x = -\frac{5}{3}, -90^\circ < x < 0^\circ \).
13) Find all of the solutions of the equation $\cos t - \sin 2t = 0$.

14) Find the exact value of the following:
   a) $\arcsin(\sin \frac{5\pi}{4})$
   b) $\arccos(\cos \frac{5\pi}{4})$
   c) $\arctan(\tan \frac{7\pi}{4})$

15) Find the exact value of the following:
   a) $\sin(\tan^{-1} - \sqrt{3})$
   b) $\cos(\sin^{-1} 1)$

16) Write the expression as an algebraic expression in $x$ for $x > 0$  (i.e – get rid of the trig functions)
   $\sin(\tan^{-1} x)$

17) Solve $\sin^2 x - \sin x - 1 = 0$. 