Math 128: Exam 3 Study Guide

I will provide the unit circle and formulas from sections 7.5 and 7.6. Electronic devices of any kind are not allowed. Notecards of any kind are not allowed.

1) Draw the following in standard position (6.1):
   a) \(-\frac{2\pi}{3}\)  
   b) \(\frac{16\pi}{3}\)

2) Find a positive angle less than 360 degrees or \(2\pi\) that is coterminal with the following (6.1):
   a) \(-760^\circ\)  
   b) \(\frac{17\pi}{6}\)

3) Find the exact value (6.2):
   a) \(\tan \frac{5\pi}{6}\)  
   b) \(\csc \frac{\pi}{4}\)  
   c) \(\cos \frac{15\pi}{2}\)  
   d) \(\sec \frac{7\pi}{6}\)

4) The terminal point \(P(x,y)\) given by the real number \(t\) is given. Find \(\sin t\), \(\cos t\), and \(\tan t\) (6.2):
   \[
   \left(\frac{\sqrt{5}}{5}, \frac{2\sqrt{5}}{5}\right)
   \]

5) Find the exact value (6.2):
   a) \(\sin 45^\circ + \sin 135^\circ\)
   b) \(\csc 45^\circ \tan 60^\circ\)
   c) \(\sin^2 40^\circ + \cos^2 40^\circ\)
   d) \(\tan^{-1} \left( \tan \left( \frac{4\pi}{3} \right) \right)\)

6) Given that \(0 \leq t \leq \pi/2\) and \(\sin t = 2/5\), find \(\cos t\) (6.3):

6) Find the values of the trig functions of \(t\) from the given information (6.3):
   a) \(\cos t = -\frac{3}{4}; \csc t < 0\)
   b) \(\sec t = 3; \sin t < 0\)
   c) \(\csc \left( \cos^{-1} \frac{5}{12} \right)\)

7) Find the amplitude, period, and phase shift, and graph one complete period (6.6):
   \[
y = 2\sin \left( \frac{2}{3} x - \frac{\pi}{3} \right)
   \]

8) Find the period and the asymptotes, and sketch one complete period (6.5):
   \[
y = 2\csc \left( \pi x - \frac{\pi}{3} \right)
   \]

9) Evaluate the following (7.1):
   a) \(\cos^{-1} \left( \cos \left( \frac{-\pi}{6} \right) \right)\)
   b) \(\cos \left( \sin^{-1} \frac{\sqrt{3}}{2} \right)\)
   c) \(\tan \left( \sin^{-1} \frac{1}{2} \right)\)
   d) \(\tan^{-1} \left( \tan \left( \frac{4\pi}{3} \right) \right)\)

10) Find the exact value, if it is defined (7.1):
   a) \(\cos \left( \cos^{-1} \frac{1}{4} \right)\)
   b) \(\tan \left( \cos^{-1} \frac{1}{4} \right)\)
   c) \(\csc \left( \cos^{-1} \frac{5}{12} \right)\)
12) Solve from \([0, 2\pi]\) (7.3 and 7.6):

a) \(\sin^2 \theta = 2 \cos \theta + 2\)

b) \(2 \cos 3\theta = 1\)

c) \(2 \sin \frac{\theta}{2} + \sqrt{3} = 0\)

d) \(\cos 2\theta = 2 - 2 \sin^2 \theta\)

13) Verify the following identities (7.4):

a) \((1 - \tan x)(1 - \cot x) = 2 - \sec x \csc x\)

b) \(\frac{\sin 2x}{1 + \cos 2x} = \tan x\)

c) \(\frac{\sin 2x}{\sin x} - \frac{\cos 2x}{\cos x} = \sec x\)

14) Find the exact value using a sum, difference, half-angle or double-angle formula (7.5 and 7.6):

a) \(\sin 15^\circ\)

b) \(\cos 112.5^\circ\)

c) \(\sin 5^\circ \cos 40^\circ + \cos 5^\circ \sin 40^\circ\)

15) Find the exact value using a difference formula (7.5):

a) \(\sin \left( \cos^{-1} \frac{2}{3} - \tan^{-1} \frac{1}{2} \right)\)

b) \(\cos \left( \tan^{-1} \left( -\frac{4}{3} \right) + \sin^{-1} \frac{4}{5} \right)\)

16) Find \(\sin 2x, \cos 2x, \tan 2x\) from the following (7.6):

a) \(\csc x = 4, \tan x < 0\)

b) \(\cot x = \frac{2}{3}, \sin x > 0\)

17) Find \(\sin \frac{x}{2}, \cos \frac{x}{2}, \tan \frac{x}{2}\) from the following (7.6):

a) \(\tan x = 1, x\) is in Quadrant I

b) \(\sec x = \frac{3}{2}, x\) is in Quadrant IV

18) Find the exact value using a double-angle formula (7.6):

a) \(\cos \left( 2 \tan^{-1} \frac{12}{5} \right)\)

b) \(\sec \left( 2 \sin^{-1} \frac{1}{4} \right)\)

19) A tower is 50 feet tall. A guy wire is attached from the ground to the top of the tower, and the wire makes an angle of 60 degrees with the ground. How long is the guy wire? (8.1)

20) A man standing on a level plane sees a building that is 800 feet tall. The angle of elevation to the top of the building is 30 degrees. How far away from the building is the man? (8.1)

21) Two cars leave an intersection at the same time traveling in opposite directions. The angle of road between them is 135 degrees. If one car travels 10 miles per hour and the other car travels 15 miles per hour, how far apart are the cars after one hour? (8.3)