TRIGONOMETRY – PRACTICE EXAM 3 – Chapters 6 – 7

DIRECTIONS/REMARKS:
- Do not write on exam (except your name) – use front and back of scratch paper provided.
- This exam is closed-book, closed-notes, closed-'everything' except a calculator and 4x6 note-card.
- "EXACT" means answer must be in terms of whole #'s, fractions, and/or radicals – not calculator answers!
- Except for trig. functions of special and quadrantal angles, sufficient work must be shown for any credit!
- Problems 6,7: The opposite side of an upper-case letter angle is the corresponding lower-case letter
  (i.e. for triangle DEF, side 'd ' is opposite angle D, side 'e' is opposite angle E, & side 'f' is opposite angle F)
- Problems 6,7,10: Be sure to use significant figures in the final answers.

PROBLEMS (10 points per entire problem):

1. Using calculator, find (to 4 decimal places) :   a) $\arccos(-0.4115)$ b) $arccsc(7.2865)$

2. Find EXACTLY: a) $\cos(2\arctan(-2))$ b) $\tan\left(2\arcsin\dfrac{3}{u}\right),\ (where\ u > 0)$

3. Solve each equation for EXACT solutions over $[0, 2\pi)$: a) $\tan\theta + 1 = \sqrt{3} + \sqrt{3}\cot\theta$ b) $2\sin\theta = 1 - 2\cos\theta$

4. Solve each equation for **ALL** EXACT SOLUTIONS: a) $-2\cos 2\theta = \sqrt{3}$ b) $4\cos 2\theta = 8\sin\theta\cos\theta$

5. Solve each equation for the EXACT solution: a) $\arccos\left(y - \dfrac{\pi}{3}\right) = \dfrac{\pi}{6}$ b) $\arcsin x + \arctan x = 0$

6. Determine the remaining sides and angles of each triangle XYZ:

   a) Y = 38° 40', x = 19.7 cm, Z = 91° 40'   b) Z = 88.70°, y = 56.87 yd, z = 112.4 yd

7. Determine the remaining sides and angles of each triangle PQR:

   a) R = 28.3°, q = 5.71 in, p = 4.21 in   b) p = 4.00 ft, q = 5.00 ft, r = 8.00 ft

8. Given vectors $\mathbf{u} = \langle -4,-10\rangle$ and $\mathbf{v} = 5\mathbf{i} - 7\mathbf{j}$, find:

   a) $2\mathbf{u} + 3\mathbf{v}$ b) $\mathbf{u} \bullet (4\mathbf{v})$ c) $|\mathbf{v} - \mathbf{u}|$ d) the angle between $\mathbf{u}$ and $\mathbf{v}$ e) are $\mathbf{u}$ and $\mathbf{v}$ orthogonal?

9. a) Given a vector $\mathbf{w}$ with magnitude 20 and direction angle 300°, write $\mathbf{w}$ in the form $\langle a,b\rangle$
      (Hint: find its horizontal & vertical components)
    b) Find the magnitude & direction of vector $\mathbf{m} = \langle -2,3\rangle$

10. a) A 30.0 lb force is required to hold an 80.0-lb rock on an incline.
       What is the angle the incline makes with the horizontal?

    b) A ship leaves port on a bearing of 110.0°, traveling 8.80 mi.
       It then turns and sails 2.40 mi on a bearing of N 120.0° W.
       How far is the ship from the port? What is its bearing from port?

BONUS QUESTIONS:
   (B1) Normalize vector **u** from Problem 8

   [Possible bonus questions include <u>properties</u> of inverse trig functions, parallelograms, triangles, and/or vectors]