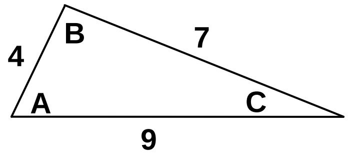
Name: ______________________________

Thursday, November 15, 2012

MTH 113 Chapter 6 Test (Sections 6.1 – 6.7)

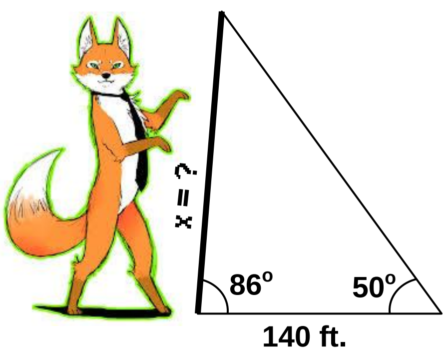
(unless otherwise specified round solutions to 2 decimal places)

1. (19 pts.) Solve the following oblique triangle (SSS – Recommend find angle opposite longest side 1st)…

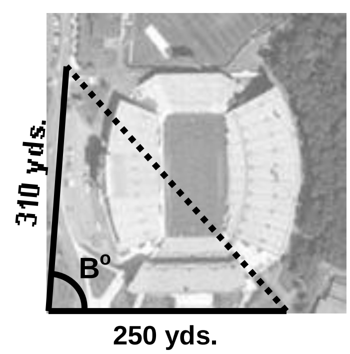


A = **B** = **C** =

2. (7 pts.) CARFAX has decided to place a statue of the CARFOX outside its main headquarters. The statue leans at an angle of approximately 86^o. At a distance 140 feet from the base of the fox statue, the angle to the top is 50^o. Use the data given to **approximate** the height of the fox statue by finding the distance from the base to the top. This now begs the question, "What does the fox ~~say~~ WEIGH?"



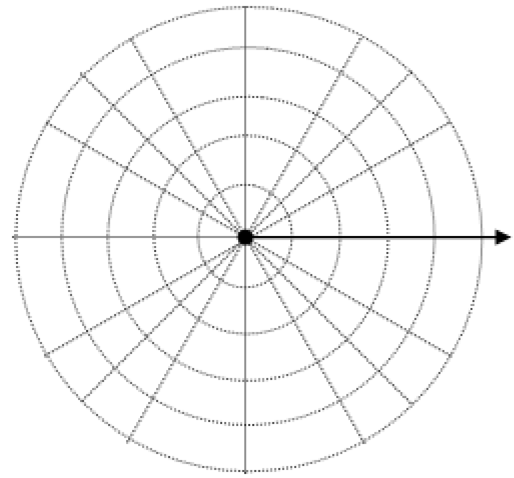
3. (7 pts.) Imagine you and a friend have decided to walk around beautiful Lane Stadium at Virginia Tech. Starting from a point outside the stadium, you walk directly to the east while your friend walks on a bearing of N10^oE. After 10 minutes, you covered a distance of 270 yards, and your friend travelled 310 yards. Calculate the distance between you and your friend at this point (2 decimal places).



4. (8 pts.) Plot and label the following polar coordinates (r,θ)…

A: $\left(-2, \frac{\pi}{6}\right)$

B: $\left(3, -\frac{\pi}{2}\right)$



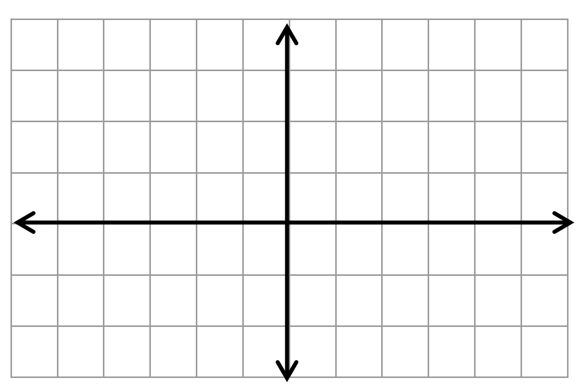
5. (6 pts.) Find the exact rectangular coordinates of the point whose polar coordinates are $\left(2, \frac{\pi}{6}\right)$ --- leave in any radical signs

6. (6 pts.) Find the polar coordinates (θ in radians) of the point with rectangular coordinates $(-1, \sqrt{3}\,)$ --- please put angle in radians (not degrees) --- (r,θ) with $0 \le \theta < 2\pi$

7. (12 pts.) Plot **z = – 4 + 2i** in the complex plane **AND** find it's absolute value (simplify) **AND** express **z** in polar form (radians for angle measure)

|z| =

z in polar form:



8. (20 pts.) If **v** = 2**i** + 4**j** and **w** = 3**i** – 5**j**, find and simplify each of the following…

v – w

3**v** + 2**w**

||**w**||

v • w

9. (8 pts.) Find the angle between the vectors **v** = 8**i** – 6**j** and **w** = 5**i** + 2**j** (round to 2 decimal places)

10. (7 pts.) One day in class, my dry erase marker went bad, and I threw the marker toward the trash can at an angle of **45^o** with the horizontal. If I threw the marker with a velocity of **20 feet per second**, express the throw as a vector in terms of **i** and **j**. If exact values not possible, round to 2 decimal places.

Extra Credit:

1. (1 pt.) Are the vectors **v** = 7**i** + 6**j** and **w** = – 5**i** + 6**j** orthogonal?

2. (1 pt.) Find the unit vector in the same direction as **v** = 12**i** – 5**j** (simplify)

3. (2 pts.) The approximate longitude and latitude of Calhoun here in Huntsville is P_1 = (-86.7, 34.7). The approximate longitude and latitude of Virginia Tech is (-80.4, 37.2). Let **v** be the vector from the initial point P_1 at Calhoun to terminal point P_2. Write **v** in terms of unit vectors **i** and **j**.

-- Formulas --

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad \text{--- or ---} \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$a^2 = b^2 + c^2 - 2(bc)\cos A \ \ldots$$

$$x^2 + y^2 = r^2 \qquad x = r\cos\theta \qquad y = r\sin\theta \qquad \tan\theta = y / x$$

$$|z| = |a + bi| = \sqrt{a^2 + b^2} \qquad z = r(\cos(\theta) + i\sin(\theta))$$

$$||\mathbf{v}|| = \sqrt{a^2 + b^2} \qquad \mathbf{u} = \frac{\mathbf{v}}{||\mathbf{v}||} \qquad \mathbf{v} = ||\mathbf{v}||\cos\theta\,\mathbf{i} + ||\mathbf{v}||\sin\theta\,\mathbf{j}$$

$$\mathbf{v} \bullet \mathbf{w} = ac + db \qquad \cos\theta = \mathbf{v} \bullet \mathbf{w} / ||\mathbf{v}||\,||\mathbf{w}|| \qquad \mathbf{v} = (x_2 - x_1)\mathbf{i} + (y_2 - y_1)\mathbf{j}$$