

Name _____

22M:005

May 1, 2006

Score (100 possible) _____

Exam #3

Answer each question to the best of your ability. Show all of your work.

1. Solve for all triangles ABC satisfying:
a. $A = 41.4^\circ$, $b = 2.78$ yd, $c = 3.92$ yd (6 points)

b. $C = 29^\circ 50'$, $a = 8.61$ m, $c = 5.21$ (6 points)

2. Assume $\mathbf{u} = \langle 1, -1 \rangle$ and $\mathbf{v} = \langle 3, 6 \rangle$. Find
a. $4\mathbf{u} + \mathbf{v}$ (3 points)

b. $\mathbf{u} \cdot \mathbf{v}$ (3 points)

c. $|2\mathbf{u} - 2\mathbf{v}|$ (3 points)

d. The angle between \mathbf{u} and \mathbf{v} . (3 points)

3. To determine the distance b across a deep canyon, a surveyor lays off a distance $a = 582$ yd. She then finds that $B = 32^\circ 50'$ and $C = 102^\circ 20'$. Find b . (10 points)
4. An airplane is headed on a bearing of 174° at an airspeed of 240 km per hr. A 30 km per hr wind is blowing from a direction of 245° . Find the groundspeed and resulting bearing of the plane. (10 points)
5. A hot-air balloon is rising straight up at the speed of 32 ft per second. Then a wind starts blowing horizontally at 17 ft per second. What will the new speed of the balloon be and what angle with the horizontal will the balloon's path make? (10 points)

6. Given $x = -4\sqrt{2} + 4i\sqrt{2}$ and $y = 3\text{cis}(315^\circ)$
- Write x in polar coordinates. (3 points)
 - Find $x * y$ and write the result in polar coordinates. (5 points)
 - Calculate $\frac{x}{y}$ and write the result in rectangular coordinates. (5 points)
 - Calculate x^8 and write the result in rectangular coordinates. (5 points)
 - Calculate all of the fourth roots of y and write the results in polar coordinates. (5 points)

7. Solve the following system of linear equations using either substitution or elimination: (7 points)

$$\begin{cases} 4x + 3y = -13 \\ -x + y = 5 \end{cases}$$

8. Write the following system of equations in matrix form, then solve using matrix operations: (15 points)

$$\begin{cases} x + 3y - 6z = 7 \\ 2x - y + z = 1 \\ x + 2y + 2z = -1 \end{cases}$$

9. Will you be in class on Wednesday? (1 point)