
Name: ____________________________  December 8, 2009

Instructions: The exam is closed book, closed notes and calculators are not allowed. You are only allowed one letter-size sheet of paper with anything on it. You will have 60 minutes for this test. The point value of each problem is written next to the problem - use your time wisely. The total number of points is 100. Please show your work. Partial credit will be given only for work shown.

Problem 1 (13pts). In the triangle below, we know $A = 70^\circ$, $C = 50^\circ$ and $a = 7$. Find the values of $B$, $b$, and $c$. 

Problem 2 (15pts). Use the law of sines to solve (if possible) the triangle in which we know $A = 30^\circ$, $a = 10$ and $b = 10\sqrt{2}$. If two solutions exist, find them both.

Problem 3 (12pts). In a triangle we know that $a = 5$, $c = 7$, and $B = 120^\circ$. Find the value of the side $b$. 
Problem 4 (12pts). The vector $v$ has initial point $(-1, -2)$ and terminal point $(2, 3)$.
(1) Graph the vector.
(2) Find the component form of $v$.
(3) Find the magnitude of $v$.

Problem 5 (13pts). Consider the vector $v = 3i - 4j$.
(1) Graph the vector in the standard position.
(2) Find the magnitude and direction angle of $v$.
(3) Is the vector $v$ orthogonal to the vector $u = \langle -\frac{1}{3}, -\frac{1}{4} \rangle$?
Problem 6 (15pts). Consider the vectors $\mathbf{u} = \langle 0, 2 \rangle$ and $\mathbf{v} = \langle 3, 3 \rangle$.

(1) Find the projection of $\mathbf{u}$ onto $\mathbf{v}$ and its magnitude (length).

(2) Find the distance from the tip of the vector $\mathbf{u}$ to the vector $\mathbf{v}$. (Hint: solve the right triangle.)
Problem 7 (20pts). Consider the complex number $z = \sqrt{3} + i$.

1. Represent $z$ graphically and find the absolute value of $z$.
2. Find the trigonometric form of $z$.
3. Using the trigonometric form, compute the sixth power $z^6$. If you work correctly, you should be able to find the exact value.