EXAM 4 - MATH 131 YOUR NAME:

Thursday, April 14 George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

- 1. Let $\vec{v} = \langle -4, 2 \rangle$ and $\vec{w} = -2\vec{i} + 3\vec{j}$.
 - (a) Draw the two vectors in the Cartesian plane.

(b) Find the unit vector in the direction of \vec{v} .

- (c) Compute the sum $\frac{1}{2}\vec{v} 3\vec{w}$.
- (d) Find the angle between \vec{v} and \vec{w} rounded to the nearest degree.

(e) Compute $\operatorname{proj}_{\vec{v}}\vec{w}$.

2. A plane is flying at an airspeed of 300 mph at a heading of 30°. A wind of 45 mph is blowing from the west. Find the ground speed and the ground heading of the plane. (Please, show all your work.)

- 3. Perform the following operations and write your answers in standard form:
 - (a) $(-1 + \sqrt{-25}) (8 \sqrt{-16})$

(b)
$$(-6 + \sqrt{-81})(4 - \sqrt{-9})$$

(c)
$$\frac{2-7i}{4+3i}$$

(d) i^{263}

4. (a) Write z = 3 - 3i in trigonometric form.

(b) Compute $(3-3i)^6$ using De Moivre's formula.

(c) Perform the operation and put the result in standard form without using a calculator $3(\cos 28^{\circ} + i \sin 28^{\circ}) \cdot 4(\cos 17^{\circ} + i \sin 17^{\circ})$

(d) Perform the operation and put the result in standard form without using a calculator $\frac{18(\cos 50^\circ + i \sin 50^\circ)}{3(\cos 140^\circ + i \sin 140^\circ)}$

5. (a) Find all complex sixth roots of 64.

(b) Solve the equation $z^5 + 32 = 0$ for complex z.