

YOUR NAME: _____

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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. Consider the vectors $\vec{v} = \langle 5, 3 \rangle$ and $\vec{w} = \langle 4, -2 \rangle$.

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

(b) Find the angle between \vec{v} and \vec{w} rounded to the nearest degree.

(c) Compute $\text{proj}_{\vec{v}} \vec{w}$.

2. (a) Write the complex number $2 + 2i$ in trigonometric form.

(b) Calculate the exact value of $(2 + 2i)^9$.

3. Find the four complex fourth roots of $-16 + 16i\sqrt{3}$. You may express your answer either in standard or trigonometric form as desired.

4. Find the vertex, the focus and the directrix of the parabola $4x^2 - 12x + 12y + 7 = 0$.

5. A hyperbola has vertices at the points $(6, 3)$ and $(2, 3)$ and foci at the points $(7, 3)$ and $(1, 3)$. Find the equation of this hyperbola in the standard form.