

Show all your work for full credit. Unsupported answers = reduced points. Give exact values unless otherwise stated. Clearly identify your answers. Remember, the **process** is the most important part.

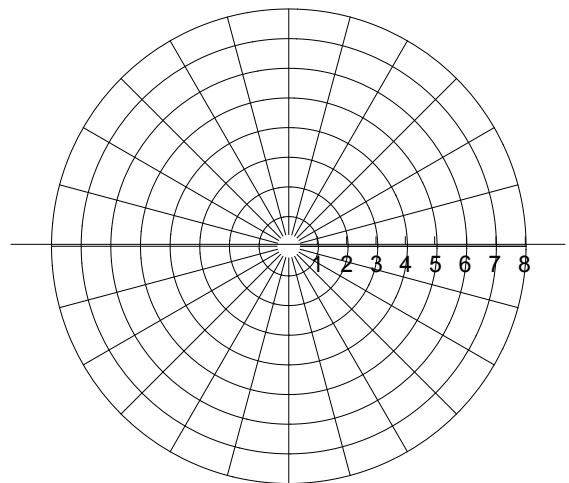
- 1) Convert the point whose polar coordinates are $(12, \frac{5\pi}{3})$ to rectangular coordinates.

[/2]

- 2) Find two ways to write the rectangular point $(-2\sqrt{2}, 2\sqrt{2})$ in polar form, one with $r > 0$, and one with $r < 0$, and both with $0 \leq \theta \leq 2\pi$.

[/4]

- 3) a) Make a sketch of the polar function $r = 3 + 3\cos(\theta)$, and
 b) write the equation in rectangular coordinates.



[/4]

4) Let $z_1 = 8(\cos(75^\circ) + i\sin(75^\circ))$ and $z_2 = 2(\cos(15^\circ) + i\sin(15^\circ))$. Write answers in polar form and rectangular form.

a. Find $z_1 \cdot z_2$

[/3]

b. Find $\frac{z_1}{z_2}$

[/3]

c. Find z_2^6 .

[/3]

5) Find the three cube-roots of $8i$. Write answers in polar form and rectangular form.

[/4]

6. Vector \mathbf{v} has initial point $(12, 3)$, and final point $(-2, 8)$.
- a) Find the component form for the vector in standard position.

[/3]

- b) Write vector \mathbf{v} in terms of the standard vectors \mathbf{i} and \mathbf{j} .

[/3]

- c) Find the modulus of \mathbf{v} . Round to two decimal places.

[/3]

- d) Find the argument of \mathbf{v} . Round to two decimal places.

[/3]

8. A 20 Newton force in the direction of $\langle 2, 3 \rangle$ moves an object along the line segment connecting the points $(4, 1)$ to $(13, 5)$ measured in meters. Calculate the work done by the force on the object.

[/3]

9. Find the angle between the vector vectors $\mathbf{u} = -5\mathbf{i} + 6\mathbf{j}$ and $\mathbf{v} = 7\mathbf{i} + 2\mathbf{j}$.

[/3]

10. Given the vectors $\mathbf{u} = \langle 3, 4 \rangle$ and $\mathbf{v} = \langle 12, 5 \rangle$, find

a) $\text{comp}_{\mathbf{v}} \mathbf{u}$

[/3]

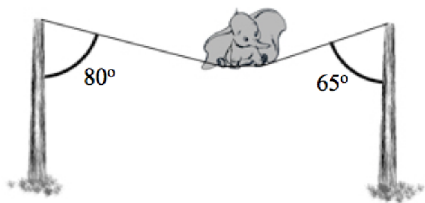
b) $\text{proj}_{\mathbf{v}} \mathbf{u}$

[/3]

c) resolve \mathbf{u} into two vectors \mathbf{u}_1 and \mathbf{u}_2 , where \mathbf{u}_1 is parallel to \mathbf{v} , and \mathbf{u}_2 is orthogonal to \mathbf{v} .

[/3]

Extra Credit Dumbo the elephant landed on a telephone wire making angles of 80° and 65° with respect to each pole. If Dumbo weighs 500 pounds, find the tension in the wire on each side. Round to two decimal places. Be sure to show your work.



[/3]