

Precalculus Practice: Polar coordinates & Equations

Calculator OK

I. Multiple Choice. Put the CAPITAL letter of the correct answer choice in the blank.

_____ 1. Which of the following equations gives the same graph as the polar equation $\theta = -\frac{\pi}{6}$

- (A)
- $\theta = \frac{29\pi}{6}$
- (B)
- $\theta = \frac{\pi}{6}$
- (C)
- $\theta = \frac{7\pi}{6}$
- (D)
- $y = \frac{\sqrt{3}}{2}x$
- (E)
- $y = -\frac{1}{2}x$

_____ 2. Convert the rectangular equation $x^2 + y^2 - 2y = 0$ to polar form.

- (A)
- $r = 2 \cos \theta$
- (B)
- $r = 2 \sin \theta$
- (C)
- $r = 2 \sec \theta$
- (D)
- $r = 2 \tan \theta$
- (E)
- $r = 2 \csc \theta$

_____ 3. Convert the polar equation $r = \frac{2}{2 \sin \theta - 3 \cos \theta}$ to rectangular form.

- (A)
- $x^2 + y^2 = 6$
- (B)
- $y = \frac{2}{3}x + 1$
- (C)
- $y = \frac{3}{2}x + 1$
- (D)
- $y = -\frac{3}{2}x + 1$
- (E)
- $y = -\frac{2}{3}x + 1$

_____ 4. Which of the following is a polar zeros for the rose curve $r = 5 \sin 2\theta$, where $0 \leq \theta \leq 2\pi$ are

- (A)
- $\frac{\pi}{6}$
- (B)
- $\frac{\pi}{4}$
- (C)
- $\frac{\pi}{3}$
- (D)
- $\frac{5\pi}{6}$
- (E)
- $\frac{3\pi}{2}$

_____ 5. Which of the following is NOT an equivalent polar coordinate for $(-2, 2\sqrt{3})$?

- (A)
- $\left(-4, \frac{4\pi}{3}\right)$
- (B)
- $\left(4, \frac{2\pi}{3}\right)$
- (C)
- $\left(-4, -\frac{\pi}{3}\right)$
- (D)
- $\left(4, \frac{8\pi}{3}\right)$
- (E)
- $\left(-4, -\frac{7\pi}{3}\right)$

_____ 6. Which of the following gives the equation of a limaçon?

- (A)
- $r = 4 - 4 \sin \theta$
- (B)
- $r = 3 - 5 \cos \theta$
- (C)
- $r = 3 + 2 \cos \theta$
- (D)
- $r = 1 - 2 \cos 3\theta$
- (E) None of these

Free Response/Short Answer.

1. Given the polar coordinate $\left(4, \frac{3\pi}{4}\right)$

- a) graph the polar coordinate.
- b) list the other three equivalent polar coordinates within one rotation (positive & negative)
- c) Convert the coordinate to an EXACT rectangular coordinate.

2. Given the rectangular coordinate $(4, -4\sqrt{3})$.

- a) graph the rectangular coordinate.
- b) Convert the coordinate to an equivalent polar coordinate.
- c) List the other three equivalent polar coordinates within one rotation (positive & negative)

3. Convert the following equations to rectangular form and graph each equation.

a) $r = \sqrt{5}$ b) $r = 2 \csc \theta$ c) $r = -\sec \theta$ d) $r = -6 \sin \theta$

e) $r = 7 \tan \theta \sec \theta$ f) $r = \frac{1}{2 \cos \theta - \sin \theta}$

4. Convert the following equations to polar form and graph each equation.

a) $x^2 + y^2 = 7$ b) $3x - 2y = 1$ c) $(x - 5)^2 + y^2 - 25 = 0$ d) $y = -1$

5. Sketch the graph $(x^2 + y^2)^2 = 50xy$ by first converting the equation to polar form. List any and all symmetries of the graph.

6. Write a polar equation of each of the following:



