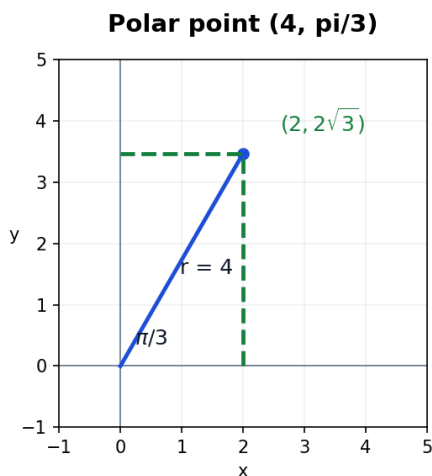


Solutions

8.1 Plotting and Equivalent Representations

8.1.1. Convert the polar point $(4, \pi/3)$ to Cartesian coordinates.

Solution. $x = 4\cos(\pi/3) = 2$ and $y = 4\sin(\pi/3) = 2\sqrt{3}$.



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Cartesian coordinates are $(2, 2\sqrt{3})$.

8.1.2. Give an equivalent representation of $(3, \pi/4)$ with negative radius.

Solution. One answer is $(-3, 5\pi/4)$.

8.1.3. Are $(2, \pi/2)$ and $(-2, 3\pi/2)$ the same point?

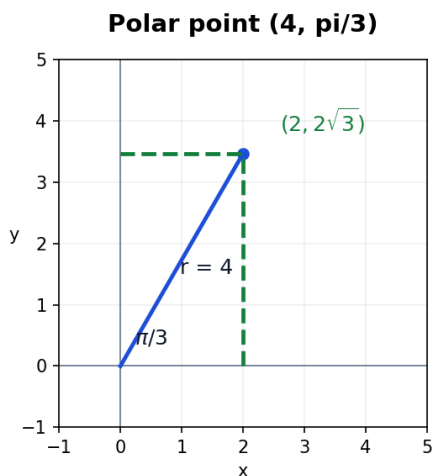
Solution. Yes. Both convert to $(0, 2)$.

Solutions

8.2 Conversion

8.2.1. Convert $(r, \theta) = (4, \pi/3)$ to Cartesian coordinates.

Solution. The coordinates are $(2, 2\sqrt{3})$.



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Cartesian coordinates are $(2, 2\sqrt{3})$.

8.2.2. Convert $(-3, -3)$ to polar coordinates with positive radius.

Solution. $r = 3\sqrt{2}$ and one angle is $5\pi/4$.

8.2.3. Convert $r = 4\cos \theta$ into a Cartesian equation.

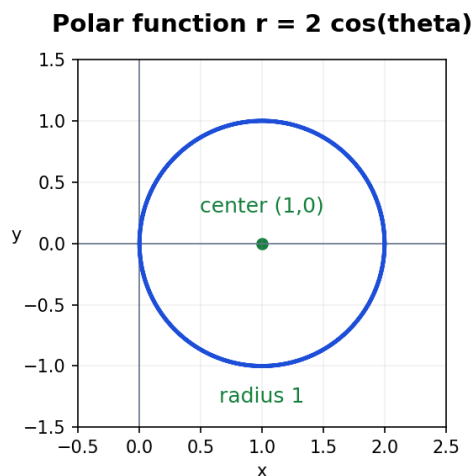
Solution. Multiply by r : $r^2 = 4r\cos \theta$, so $x^2 + y^2 = 4x$, or $(x - 2)^2 + y^2 = 4$.

Solutions

8.3 Polar Graphs and Symmetry

8.3.1. For $r = 2\cos\theta$, find points at $\theta = 0, \pi/3, \pi/2$.

Solution. The radii are 2, 1, 0. Cartesian points are $(2, 0), (1/2, \sqrt{3}/2), (0, 0)$.



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The Cartesian equation is $(x - 1)^2 + y^2 = 1$.

8.3.2. Does $r = 2\cos\theta$ have symmetry across the polar axis?

Solution. Yes. Replacing θ with its negative leaves cosine and the equation unchanged.

8.3.3. For $r = 1 + \cos\theta$, find the maximum radius and an angle where the graph reaches the pole.

Solution. The maximum radius is 2 at $\theta = 0$; the pole occurs at $\theta = \pi$.