- 5. [6 points] The parts of the question below are unrelated.
  - **a**. [3 points] The circle below is centered at the origin and has a radius of 2.5 meters. The arc shown in bold has a length of 5 meters. Give the coordinates of P in exact form or rounded to at least three decimal places.



Solution: We know that the arc length spanned in a circle of radius r by an angle of  $\theta$  radians is given by  $r\theta$ . In this case, the arc length is 5m and the radius is 2.5m. Therefore, the point P corresponds to an angle of  $\theta = 5/2.5 = 2$  radians. We then have that the coordinates of P are  $(2.5\cos(2), 2.5\sin(2))$ .

Coordinates of  $P = (2.5\cos(2), 2.5\sin(2))$ 

b. [3 points] Trying to find the cosine of 310 degrees, Sofia enters cos(310) into her calculator and gets -0.52534763851. How does she immediately know that something is wrong? Draw a picture and explain in words how Sofia knows her calculator must not have been in "degree mode"?

Solution: The cosine of 310 degrees is the x-coordinate of the point on the unit circle which corresponds to an angle of 310 degrees. This point has a positive x-coordinate, as pictured below. Therefore, Sofia was expecting a positive number and knows something is wrong when she gets a negative number.

