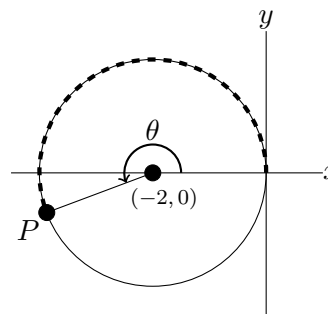


4. [5 points]

In the diagram at right, a circle of radius 2 is centered at the point  $(-2, 0)$ . The **bold**, dashed arc going from the origin to the point  $P$  has length 7.



(i) Find the exact value of the measure of the angle  $\theta$ , in radians.

Answer:  $\theta = \underline{\frac{7}{2}}$

(ii) Find the  $(x, y)$ -coordinates of the point  $P$ .

Answer:  $(x, y) = \underline{\left( 2\cos\left(\frac{7}{2}\right) - 2, 2\sin\left(\frac{7}{2}\right) \right)}$

5. [12 points] Billy Corgi (the lead singer of The Squash) left his pool uncovered when he went on tour. Due to the rainy weather while he was on tour, the volume, in  $m^3$ , of the water in the pool  $w$  weeks after he goes on tour is given by  $p(w) = 10e^{0.05w}$ .

a. [3 points] Find  $p^{-1}(50)$  and interpret your answer in the context of this problem. Show your work. Your answer should be in exact form or correct to two decimal places.

$$10e^{0.05w} = 50$$

$$e^{0.05w} = 5$$

$$0.05w = \ln(5)$$

$$w = \frac{\ln(5)}{0.05}$$

Answer:  $p^{-1}(50) = \underline{\frac{\ln(5)}{0.05} \approx 32.19}$

**Interpretation:**

The volume of the pool is  $50 m^3$  when Billy Corgi has been on tour for  $\frac{\ln(5)}{0.05}$  weeks.

b. [2 points] What kind of function is the composition  $h(w) = \log(p(w))$ ?

$$\log(10e^{0.05w}) = \log(10) + 0.05w \cdot \log(e)$$

i.  $h(w)$  is linear

iii.  $h(w)$  is exponential

ii.  $h(w)$  is quadratic

iv. NONE OF THESE