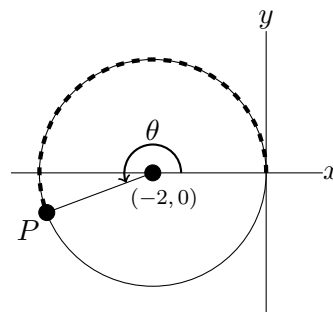


## 4. [5 points]

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:**  $\theta =$  \_\_\_\_\_

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

**Answer:**  $(x, y) =$  \_\_\_\_\_

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  $\text{m}^3$ , 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.

**Answer:**  $p^{-1}(50) =$  \_\_\_\_\_

**Interpretation:**

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

i.  $h(w)$  is linear

iii.  $h(w)$  is exponential

ii.  $h(w)$  is quadratic

iv. NONE OF THESE

**5., continued.** *Restated from the previous page.* 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  $\text{m}^3$ , of the water in the pool  $w$  weeks after he goes on tour is given by  $p(w) = 10e^{0.05w}$ .

Recall from the first exam that the volume (in  $\text{m}^3$ ) of Alex Artakis' pool  $w$  weeks after the Neverclear tour began is given by  $v(w) = 120(0.9775)^w$ . Assume that the bands started their tours at the same time.

- c. [4 points] is there a time at which Billy's pool has the same volume of water as Alex's? Either find this value, in exact form or correct to two decimal places, showing step-by-step work, or explain why no such time exists.

- d. [3 points] Give a practical interpretation of the expression  $v^{-1}(p(8))$ , or explain why the expression doesn't make sense in the context of the problem. You do **not** need to evaluate this expression.