

3. [13 points] O-guk's playful son, O-ghan, is running on the  $xy$ -plane. His position  $t$  seconds after he begins running is

$$x = \sqrt{t} - 1 \qquad y = \sin(t) + 1.$$

Assume  $x$  and  $y$  are in meters.

- a. [3 points] Does O-ghan pass through the origin? Briefly justify.

- b. [4 points] How fast is O-ghan running at  $t = 5$ ? Give your answer in **exact** form (i.e. no decimal approximations). Include **units**.

- c. [6 points] Find an equation, in  $xy$ -coordinates, of the tangent line to his path at  $t = 1$ .