

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 $t = 1$.