

1. The depth of a puddle in millimeters is given by

$$h = \frac{1}{10} (1 + \sin(\pi xy))$$

Your path through the puddle is given by

$$x = 3t \quad y = 4t$$

and your current position is  $x = 3$ ,  $y = 4$ , with  $x$  and  $y$  also in millimeters, and  $t$  in seconds.

- (a) At your current position, how fast is the depth of water through which you are walking changing per unit time?
- (b) At your current position, how fast is the depth of water through which you are walking changing per unit distance?
- (c) **FOOD FOR THOUGHT** (optional)  
There is a walkway over the puddle at  $x = 10$ . At your current position, how fast is the depth of water through which you are walking changing per unit distance *towards the walkway*.