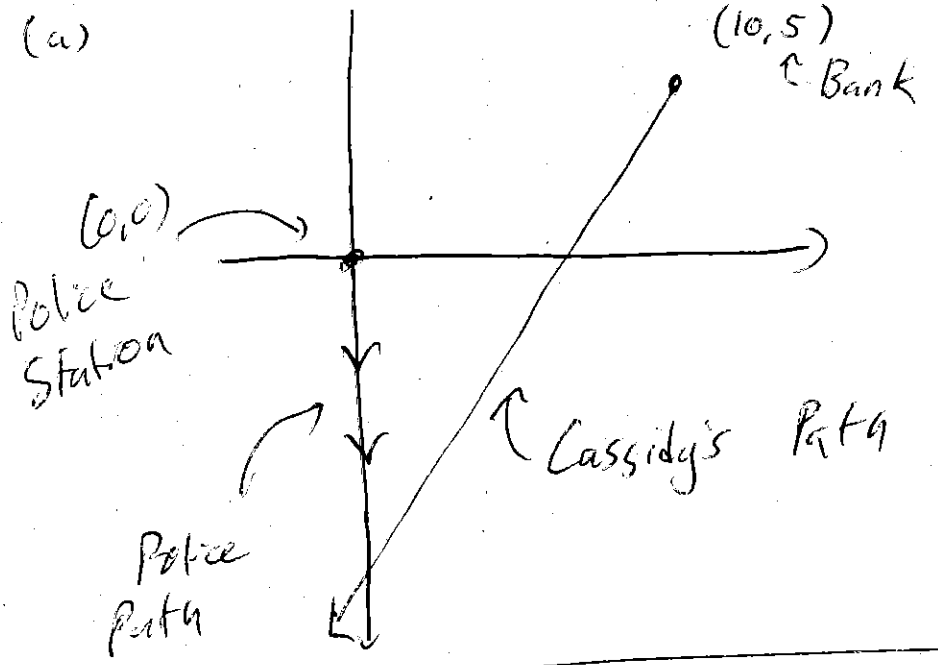
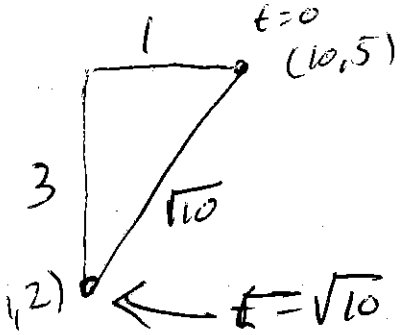
Quiz 3 Solutions

(a)



(b) 4 pts

Cassidy



$1 = r \cdot t$ $\quad 60\text{mph} = 1 \frac{\text{mile}}{\text{minute}}$

$\sqrt{10} = 1 \cdot t$

$t = \sqrt{10}$ mins

x-coord 1

$x_c(t) = x_0 + v_x \cdot t$

$t = 0$

$10 = x_0$

$t = \sqrt{10}$ $\quad (9, 2)$

$9 = 10 + \sqrt{10} \cdot v_x$

$v_x = \frac{-1}{\sqrt{10}}$

y-coord

$y_c(t) = y_0 + v_y \cdot t$

$t = 0$

$5 = y_0$

$2 = 5 + \sqrt{10} \cdot v_x$

$v_x = \frac{-3}{\sqrt{10}}$

So $x_c(t) = 10 - \frac{1}{\sqrt{10}} t$

$y_c(t) = 5 - \frac{3}{\sqrt{10}} t$

Police 3 pts

$x_p(t) = 0$

↑

move straight down

$75\text{mph} = \frac{75}{60} \frac{\text{miles}}{\text{min}} = \frac{5}{4} \frac{\text{miles}}{\text{min}}$

$y_p(t) = y_0 - \frac{5}{4} t$

$y_p(12) = 0 = y_0 - \frac{5}{4}(12)$

$y_0 = 15$

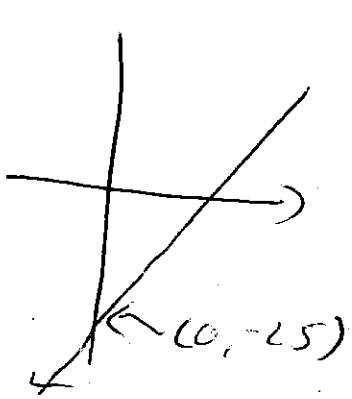
$y_0(t) = 15 - \frac{5}{4} t$.

(c) Intersect Paths

$y = 3(x-10)+5$

Plug in $x=0$

$y = -30+5 = -25$



When does Cassidy get here?

$y_c(t) = 5 - \frac{3}{\sqrt{10}}t = -25$

$-\frac{3}{\sqrt{10}}t = -30$

$t = 10\sqrt{10} \approx 31.623$

When do Police?

$y_p(t) = 15 - \frac{5}{4}t = -25$

$-\frac{5}{4}t = -40$

$t = 32$

Cassidy gets there first & escapes.

d) $d(t) = \sqrt{(x_c(t)-x_p(t))^2 + (y_c(t)-y_p(t))^2}$

$= \sqrt{\left(10-\frac{1}{\sqrt{10}}t\right)^2 + \left(5-\frac{1}{\sqrt{10}}t-\left(15-\frac{5}{4}t\right)\right)^2}$

Domain.

Open ended

$12 \le t \le 32$

Police start Chasing

Police lose race.