3a) Slope (CR), $a_{(CR)} = \frac{y_C - y_R}{x_C - x_R}$

$= \frac{5 - m + 4}{1 + 3m}$

Thus, $a_{(CR)} = \frac{9-m}{3m+1}$.

b). If $(CR) \perp (d)$, then

Slope (CR) x Slope (d) = -1

$a_{(CR)} \times a_{(d)} = -1$

but, $(d): 5x + 3y + 14 = 0$

So, $a_{(d)} = -\frac{5}{3}$.

then, $\frac{-5}{3} \times \left(\frac{9-m}{3m+1}\right) = -1$

$\cancel{-}5(9-m) = \cancel{-}3(3m+1)$

$45 - 5m = 9m + 3$.

Then, $14m = 42$.

hence, $\boxed{m = 3}$,

but, $R(-3m, m-4)$

So, $R(-9, -1)$

Now, A is the midpt of [CR]

if $x_A = \frac{x_C + x_R}{2}$ & $y_A = \frac{y_C + y_R}{2}$.

$-4 \overset{?}{=} \frac{1-9}{2}$ $\qquad 2 \overset{?}{=} \frac{5-1}{2}$

$-4 = -4$ ✓ $\qquad 2 = 2$

Thus, A is the midpoint of [CR].

4)a) $(CR) \perp (d)$ (given)

A is midpt [CR] (proved)

Thus, (d) is the perp. bisector of [CR].

b). $AB = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$

$= \sqrt{(+3)^2 + (-5)^2}$

$= \sqrt{34}$ units of length.

$CR = \sqrt{(x_R - x_C)^2 + (y_R - y_C)^2}$

$= \sqrt{(-10)^2 + (-6)^2}$.

$= \sqrt{136}$ units of length.

$= 2\sqrt{34}$.

c) In $\triangle ABC$ we have:

(d) $\perp$ [CR] at A (proved)

and, A & B belong to (d) (proved)

So, $(AB) \perp (CR)$ at A.

A is midpt of [CR] proved

So, $AC = \frac{CR}{2} = \sqrt{34}$.

hence, $AC = AB = \sqrt{34}$