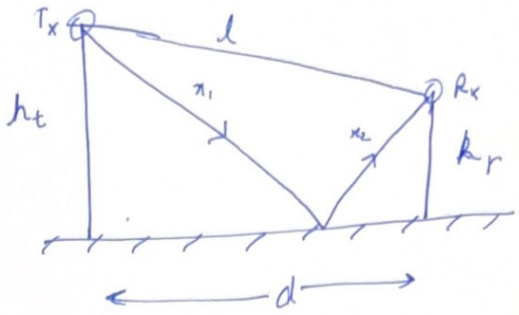
Wireless Communications

HW 1

1) $l = \sqrt{d^2 + (h_t - h_r)^2}$

~~$x_1 + x_2 = \sqrt{h_t^2 + d_1^2} + \sqrt{h_r^2 + d_1^2}$~~

$l_{Ref} = \sqrt{d^2 + (h_t + h_r)^2}$



$\Delta d = l_{ref} - l$

LOS signal $= E_0(t) = A_0 \cos(2\pi f t + \phi)$

R_x signal, $E_V(t) = A_0 \cos 2\pi f\left(\left(t + \frac{\Delta d}{\lambda}\right) + \phi\right)$

$E_{tot}(t) = E_0(t) + E_V(t)$

2) From previous question, $dl = \sqrt{d^2 + (h_t - h_r)^2}$

$d'' = \sqrt{d^2 + (h_t + h_r)^2}$

For null signal, $\frac{\Delta d}{c} = \frac{(2m+1)\pi}{2\pi f}$

Plugging into above formula -

$\Delta d = \frac{\delta\, h_r \pm h_t}{\lambda(2m+1)} =$