A. Ash

Weekly Problem 2:

(1) $V_0 = 30 m/s$

$\theta = 45°$

$x_0 = 0m$

$y_0 = 0m$

$V_x = V_0 \cos\theta$

$= (30m/s)\cos(45°) = 21.2 m/s$

$V_{y,0} = V_0 \sin\theta$

$= (30m/s)\sin(45°) = 21.2 m/s$

~~[illegible]~~

$V_f = V_0 + at \quad (V_{y,apex} = 0 m/s)$

$0 = V_{0,y} - g t_{apex}$

$\therefore V_{0,y} = g t_{apex}$

$\therefore t_{apex} = \frac{V_{0,y}}{g} = \frac{21.2 m/s}{9.81 m/s} = 2.16 s$

$\therefore t_{flight} = 2(t_{apex})$

$= 2(2.16s) = \boxed{4.32 s}$

code got 4.324

$d_{flight} = V_{0,x} t$

$= (21.2 m/s)(4.32 s) = \boxed{91.58 m}$

code got 91.58m

(2) Factoring in drag should decrease the maximum distance in the x + y directions + limit the maximum velocity in the positive + negative y direction.

(4) Looking at the trajectory for a 2kg object launched at an initial velocity of ~~[illegible]~~ 30m/s at 45° to the horizontal from (0m, 0m), we see the maximum height and maximum distance attained by the trajectory considering drag is smaller than the ideal case. Further, we see this effect is made more apparent with greater values of V_0 + smaller masses. This makes sense considering the acceleration due to drag is given by:

$$a_{drag} = \frac{-c}{m} V^2$$