Solution for homework assignment 2 Due on Wed. 02/03

All drawings are omitted for briefness.

1. (a) why set the origin of coordinates at the initial position just below the space ship. All the information can be listed as:
   For the ship:

x	y
X_0=0	
X_f=x	
V_{0x}=20 m/s	
a_x=0	

For arrow:

x	y
X_0=300 m	y_0=300 m
X_f=x	y_f=100 m
V_{0x}= -V_0cos60° m/s	V_{0y}= V_0sin60° m/s
a_x=0	a_x= - 9.8 m/s^2

Therefore, we have three simultaneous equitions:

$$x = 20\frac{m}{s}\cdot t$$

$$x = 300 - v_0 cos60° \cdot t + \frac{1}{2}\cdot 0 \cdot t^2$$

$$100 = 0 + v_0 sin60° \cdot t - \frac{1}{2}\cdot 9.8 \cdot t^2$$

Plug in the first one into the second one, solve for v_0, and then plug into third equation, solve for t. The final results are:
V_0=52.9 m/s

(b) using the equation of

$$v_f = v_i + a \cdot t$$

We have v_{fx}=v_{0x}=26.5 m/s and v_{fy}= - 17.5 m/s.
Therefore, the arrow hits the spaceship from top at an angle of tanθ= - 17.5/26.5, *e.g.33*° left-downward.