

## Design (Algorithm) for Homework 1

- Comment with my information at top of code.
- Create new function for how long it takes for the object to hit the ground:
  - Define variables.
  - Calculate the discriminant formula  $(b*b)-(4*a*c)$ .
  - Calculate the formula for the first root  $((-b+disc)/(2*a))$ .
  - Calculate the formula for the first root  $((-b-disc)/(2*a))$ .
  - Output for time it takes projectile to impact ground.
- Create new function for maximum height of the object:
  - Define variables.
  - Calculate the vertex formula  $(-b/(2*a))$ .
  - Calculate the max  $(a*(vertex*vertex)+b*vertex+c)$ .
  - Output for maximum height.
- Create main function:
  - Display my information (department and course number, name, SamID, and e-mail address.).
  - Define floating variables.
  - User input for variables.

$$S(t) = -16t^2 + V_0 t + S_0$$

$S_0$  = initial height (in ft)  
 $V_0$  = initial velocity (in ft/s)  
 $t$  = time

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = t$$

$$= \frac{-(20) \pm \sqrt{(20)^2 - 4(-16)(40)}}{2(-16)}$$

$$a = -16$$

$$b = V_0 = 20$$

$$c = S_0 = 40$$

$$X_1 = \frac{-(20) + \sqrt{2960}}{-32} \approx -1.075184$$

$$X_2 = \frac{-(20) - \sqrt{2960}}{-32} \approx 2.325184$$

~~2.33 seconds~~  
 2.33 ft/sec.  
 36.99 ft.

$$S(X_1) = -16(-1.075184)^2 + 20(-1.075184) + 40 \approx 36.9927$$

$$S(X_2) = -16(2.325184)^2 + 20(2.325184) + 40 \approx -0.00001$$

$$X = t = \frac{-(32) \pm \sqrt{(32)^2 - 4(-16)(80)}}{2(-16)}$$

$$X_1 = \frac{-(32) + \sqrt{6144}}{2(-16)} \approx -1.44949$$

$$X_2 = \frac{-(32) - \sqrt{6144}}{2(-16)} \approx 3.44949$$

$$a = -16$$

$$b = V_0 = 32$$

$$c = S_0 = 80$$

$$S(X_1) = -16(-1.44949)^2 + 32(-1.44949) + 80 \approx 92.767$$

$$S(X_2) = -16(3.44949)^2 + 32(3.44949) + 80 \approx -0.00002$$

3.45 ft/sec.  
 92.77 ft.