## Symbolic vs. Numeric Approach to Problem Solving



$$\sum F_x = m\ddot{x} \implies 0 \text{ N} = (10 \text{ kg})\ddot{x} \implies \ddot{x} = 0 \text{ m/s}^2$$
$$\sum F_y = m\ddot{y} \implies (10 \text{ kg})(-9.81 \text{ m/s}^2) = (10 \text{ kg})\ddot{y} \implies \ddot{y} = -9.81 \text{ m/s}^2$$

$$\dot{x} = \dot{x}_0 = (100 \text{ m/s})(\cos 30^\circ) = 86.6 \text{ m/s}$$
  

$$\dot{y} = (-9.81 \text{ m/s}^2)t + \dot{y}_0 = (-9.81 \text{ m/s}^2)t + (100 \text{ m/s})(\sin 30^\circ) = (-9.81 \text{ m/s}^2)t + 50 \text{ m/s}$$
  

$$x = (86.6 \text{ m/s})t$$
  

$$y = (-4.91 \text{ m/s}^2)t^2 + (50 \text{ m/s})t$$

 $t = \frac{50.0 \text{ m/s}}{4.91 \text{ m/s}^2} = 10.2 \text{ s}$ 

x = (86.6 m/s)(10.2 s) = 883 m

## Symbolic vs. Numeric Approach to Problem Solving



$$\sum F_x = m\ddot{x} \implies 0 = m\ddot{x} \implies \ddot{x} = 0$$
  

$$\sum F_y = m\ddot{y} \implies -mg = m\ddot{y} \implies \ddot{y} = -g$$
  

$$\dot{x} = \dot{x}_0 = V\cos\theta$$
  

$$\dot{y} = -gt + \dot{y}_0 = -gt + V\sin\theta$$
  

$$x = (V\cos\theta)t$$
  

$$y = -\frac{1}{2}gt^2 + (V\sin\theta)t$$

$$t = \frac{2V\sin\theta}{g}$$

 $x = \frac{2V^2 \cos \theta \sin \theta}{g} = \frac{V^2 \sin (2\theta)}{g}$ 

$$t = \frac{2(100 \text{ m/s})\sin(30^\circ)}{9.81 \text{ m/s}^2} = 10.2 \text{ s}$$
$$x = \frac{(100 \text{ m/s})^2 \sin(60^\circ)}{9.81 \text{ m/s}^2} = 883 \text{ m}$$