

## Warm Up

Jose Bautista of the Toronto Blue Jays made contact with a Chris Carpenter fastball and hit a fly ball whose height above the ground (in metres) after  $t$  seconds was represented by the function ...

$$h(t) = -4.9t^2 + 53.9t + 1$$

- (a) Determine the average rate of change in the height of the ball between  $t = 1$  s and  $t = 4$  s.
- (b) Determine the instantaneous rate of change in the height of the ball the 2 seconds after being hit. (Tangent function of TI-83 not permitted)
- (c) Determine when the instantaneous rate of change of the height of the ball is zero.
- (d) Determine the instantaneous rate of change the instant the ball is at a height of 41 m for the second time.

(a)

X	Y1
1	50
4	138.2

X=1

$$\text{ARC} = \frac{138.2 - 50}{4 - 1} \text{ m/sec}$$

$$\text{ARC} = 29.4 \text{ m/s}$$

b)

X	Y1
2.1	92.581
1.9	85.721

X=

$$\text{IRC} = \frac{92.581 - 85.721}{2.1 - 1.9} \text{ m/s}$$

$$= 34.3 \text{ m/s}$$

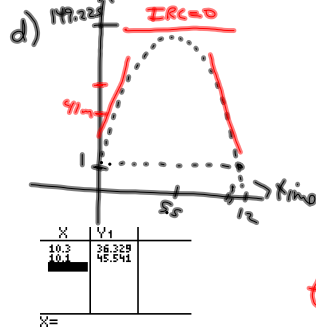
c)  $h(t) = -4.9t^2 + 53.9t + 1$

$$h(t) = -4.9(t^2 - 11t + 30.25) + 1 + 149.225$$

$$h(t) = -4.9(t - 5.5)^2 + 149.225$$

$$V(5.5, 149.225)$$

At 5.5 seconds IRC = 0 m/s (Horizontal Tangent)



When will ball reach 41m?

$$41 = -4.9t^2 + 53.9t + 1$$

$$0 = -4.9t^2 + 53.9t - 40$$

$$t = \frac{-53.9 \pm \sqrt{53.9^2 - 4(-4.9)(-40)}}{2(-4.9)}$$

$$t = 0.91 \text{ sec} \quad \text{or} \quad 10.3 \text{ sec}$$

$$\text{IRC} = \frac{36.329 - 46.541}{10.3 - 0.91} \text{ m/s}$$

$$= 76.06 \text{ m/s}$$

Could ARC = 0??

