Phys 101 – Sec # 1 **Quiz # 1 (Ch. 2)**

Name: Key **ID #**

1- A rock is released from rest from a 100-m cliff. How long does it take to fall:

a- the first 50 m?

$v_0 = 0$, $\Delta y = -50$ m, $a = -g$

$\Delta y = v_0 t - \frac{1}{2} g t^2$

$-50 = 0 - 4.9\, t^2 \Rightarrow t_1 = \sqrt{10.2} \simeq 3.2$ s

b- the second 50 m?

we find the total time needed to fall 100m first.

$v_0 = 0$, $\Delta y = -100$m, $a = -g$

$\Delta y = y_0 t^0 - \frac{1}{2} g t^2$

$-100 = 4.9\, t^2$

$\Rightarrow t = \sqrt{20.4} = 4.5$ s

then

the time needed for the second 50-m is

$t_2 = t - t_1 = 4.5 - 3.2 = 1.3$

2- A proton moving along the x axis has a position given by

$$x = 50\,t + 10\,t^{**2}$$

Where t is measured in seconds and x is in meters.

Calculate the **average speed** of the proton during the first 3.0 seconds of its motion.

Method 1

$$\text{average speed} = \frac{\Delta x}{\Delta t} = \frac{x_3 - x_0}{3 - 0}$$

$$= \frac{(50(3) + 10(3)^2) - 0}{3 - 0}$$

$$= \frac{150 + 90}{3} = \frac{240}{3}$$

$$= 80 \ \frac{m}{s}.$$

Method 2

$$\text{average speed} = \frac{v_3 + v_0}{2}$$

where $v = \frac{dx}{dt} = 50 + 20(t)$

$$\text{average speed} = \frac{[50 + 20(3)] + 50}{2}$$

$$= \frac{50 + 60 + 50}{2} = \frac{16}{2}$$

$$= 80 \ \frac{m}{s}$$