# Information for the Quiz on Ch. 3

## Fundamental Concepts

Things you must know:

(1) Definition of and approximation for average velocity (and the position update formula)

(2) Definition of momentum $\qquad g = \dfrac{1}{\sqrt{1-\left(|\vec{v}|/c\right)^2}}$

(3) The Momentum Principle (and the momentum update formula)

## Specific Results

Projectile Motion: $\quad x_f = x_i + v_{xi}\Delta t \qquad y_f = y_i + v_{yi}\Delta t - \frac{1}{2}g(\Delta t)^2$

$\qquad\qquad\quad v_{xf} = v_{xi} \qquad v_{yf} = v_{yi} - g\Delta t$

$\vec{F}_{\text{grav on 2 by 1}} = -G\dfrac{m_1 m_2}{|\vec{r}|^2}\hat{r} \qquad |\vec{F}_{\text{grav}}| \approx mg$ near Earth's surface

$\vec{F}_{\text{elec on 2 by 1}} = \dfrac{1}{4pe_0}\dfrac{q_1 q_2}{|\vec{r}|^2}\hat{r} \qquad |\vec{F}_{\text{spring}}| = k_s|s|$

## Physical Constants

$c = 3\times10^8$ m/s $\qquad g = 9.8$ m/s$^2$ $\qquad G = 6.7\times10^{-11}\text{N}\cdot\text{m}^2/\text{kg}^2$

$m_{\text{proton}} = 1.7\times10^{-27}$ kg $\qquad m_{\text{electron}} = 9\times10^{-31}$ kg

$e = 1.6\times10^{-19}\text{C} \qquad 1/4pe_0 = 9\times10^9\text{N}\cdot\text{m}^2/\text{C}^2$