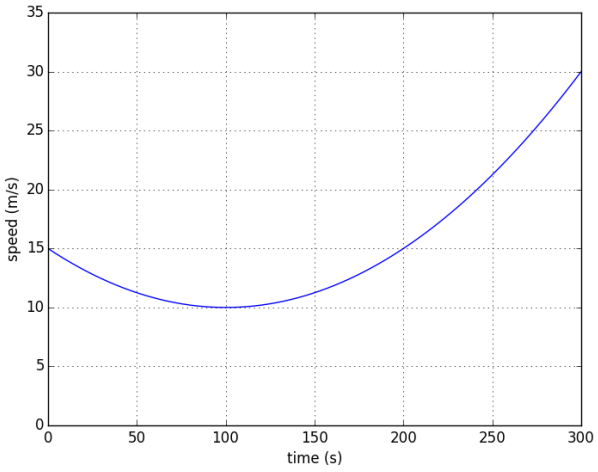
Phys 1181 Worksheet 2 Name: _____

Formulas and Graphs

1. (4) Consider the graph (right) of total speed vs. time for a car that's slowing down to make a turn and then speeding back up



(a) Estimate the slope of the curve at 100 s. Repeat at 250 s.

(b) What is the meaning of the slope (what quantity does it describe)?

(c) Estimate the total area under the curve from 0 up to 300 s.

(d) What is the meaning of this area (what quantity does it describe)?

2. (6) For each of the following physical relationships, state the proportionality between the variables in question, and sketch the dependence, assuming all other factors are constant.

(a) $F = \frac{kQ_1Q_2}{r^2}$, dependence of F on r [from an equation for electrostatic force]

(b) $U = \frac{1}{2}kx^2$ dependence of x on k [from an equation for elastic potential energy]

(c) $E = E_0 + \frac{Q}{4\pi\varepsilon_0 r^2}$ dependence of Q on E [from an equation for an electric field]

Phys 1181 Worksheet 2 Name: _____

3. (8) Go to random.org and obtain four random numbers from –15 to +15. Use them as the x and y components of two vectors $\vec{A}$, and $\vec{B}$, respectively.

(a) Show $\vec{A} - \vec{B}$, graphically

(b) Calculate the magnitude and direction (angle) of the vector $\vec{B} + 2\vec{A}$

(c) Find vector $\vec{C}$, such that $\vec{A} + \vec{B} + \vec{C} = (+1, +1)$

(d) Find the dot product and cross product of vectors $\vec{A}$ and $\vec{B}$.