Problem 1. For each of the following curves, find the slope of the tangent line at the given points.

(a) $y = x^3$ at $(2,8)$, and then at $(x_0, x_0^3)$.

(b) $y = x + x^2$ at $(1,2)$, and then at $(x_0, x_0 + x_0^2)$.

(c) $y = 1/x$ at $(1,1)$, and then at $(x_0, 1/x_0)$.

Problem 2. An automobile travels along a straight road so that at time $t > 0$ it is $x(t)$ units from its starting point. Find the instantaneous velocity at time $t_0 > 0$ if:

(a) $x(t) = t^3 + t^2$

(b) $x(t) = 2t + t^2$

(c) $x(t) = 1/t$

Extra Credit (due Thursday).

(a) Do Problem 2 for $x(t) = 1/\sqrt{t}$.

(b) Recall our problem involving Galileo’s law: A ball dropped from a height of 1600 feet is, at time $0 < t <$ time it hits the ground, $1600 - 16t^2$ feet above the ground (where we assume the ball is given no initial vertical velocity, and where we neglect the effect of air resistance). Find the velocity of the ball at the instant just before it hits the ground.