DLI Physics **Mechanics Problem Set 1** **Applied Derivatives in Mechanics**

Name Ben Law Date 11/8/17

1. A honeycrisp apple moves in a straight line with its position, x, given by the following equation: $x(t) = t^4 - 4t^3 + 2t^2 + 3t + 6$
   a. Find its position after 1 second.
   b. Find its velocity after 2 seconds.
   c. Find its acceleration after 3 seconds.
   d. What is the rate of change of the acceleration at 1 second.
   e. Use Python to graph the position, velocity and acceleration as functions of time from t=0 to t=4 seconds.
   f. Use Python to graph the rate of change of acceleration vs. time.

a. $1 - 4 + 2 + 3 + 6$

8 meters

b. $4(2)^3 - 12(2)^2 + 4(2) + 6$

$32 - 48 + 8 + 6$

$40 - 48$

-8

-8 m/s

c. $12(3)^2 - 24(3) + 4$

$12 \cdot 9 - 72 + 4$

$108 - 76$

32 m/s^2

d. $24(1) - 24$

0