Name: _____ Date: _____ Period: _____ 2016

AP Calculus – Spot Check 3 – Rates of Change **CALCULATOR ALLOWED SHOW MATH SETUP**

Algebra Mistakes (AM)	0	10	14	23	35	51	53
Stress Level (UH^2)	0	4	8	20	40	68	75

1. The table above shows the stress level of Mr. Payne and is measured in the number of head shakes and sighs, labeled as (UH^2). Mr. Payne's stress level increases with each Algebra mistake he notices on quizzes he is grading, labeled as (AM).

(Part a) Approximate the rate of change of Mr. Payne's stress level at 12 algebra mistakes, show the computations that lead to your answer and indicate units of measure.

4 — 1 unit, 2 setup, 1 ANS

$$= \frac{8-4}{14-10} = 1 \ \frac{UH^2}{AM}$$

(Part b) A student who wanted to be on Mr. Payne's good side suggested the formula of $S(x)=0.08x^{1.72}$, what is $S'(12)$?

4 — 2 s', 2 ANS

$$S' = 0.1376x^{0.72}$$

$$S'(12) = 0.82343 \ \frac{UH^2}{AM}$$

(Part c) How do **part a** and **part b** relate to each other?

2 — Instantaneous Rate of Change and Average Rate of Change

2. Given the function position function $x(t)=t^4-t^2+6t$ is measured in meters when time is measured in seconds.

(Part a) Find the average rate of change from 1 to 2 seconds.

5 — 1: x(2), 1: (x(1)), 1: Ans, 2 SETUP

$$\frac{x(2)-x(1)}{2-1} = \frac{16-4+12-(1-1+6)}{1} = 18 \ m/s$$

(Part b) Find the time value where the average rate of change is equal to the instantaneous rate of change from 1 to 2 seconds.

5 — 3 x'=18, 2 Ans

$$4t^3-2t+6=18$$

$$4t^3-2t-12=0$$

$$2t^3-t-6=0$$

$$t=1.55758$$