Math 125   **Quiz 2 — 30 Minutes**   **12:50-1:20, Tuesday, Oct. 10, 2017**

(3 questions, 40 points, no notes or calculator permitted)

1. (15 points) Using the equality $8 + 5x^2 = 5(1 + x^2) + 3$, find the indefinite integral (anti-derivative) of

$$\int \left(\frac{8 + 5x^2}{1 + x^2} + \sin(3x) + (3\sqrt{x} + x)^2 \right) dx$$

2. (13 points) Find

$$\frac{d}{dt} \int_{t^2 - t}^{t^3 - t^2} f(x) dx$$

at $t = 10$, where your answer should be expressed in the form $af(b) - cf(d)$ where a, b, c, d are numbers.

3. (12 points) American football lasts for one hour of playing time. Suppose that $f(t)$ is a measure of the efficiency of a player at time t sec into the game. This efficiency $f(t)$ is the number of seconds he can play for each calorie of energy burned, at the instant when he has played for exactly t sec. Let

$$A = \int_0^{3600} \frac{dt}{f(t)}.$$

(a) (5 points) What are the units of A?

(b) (7 points) What is the practical meaning of A?

Answers

1. $\int \left(5 + \frac{3}{1+x^2} + \sin(3x) + 9x + 6x^{3/2} + x^2 \right) dx =$
   $= 5x + 3\text{Arctan}(x) - \frac{1}{3}\cos(3x) + \frac{9}{2}x^2 + \frac{12}{5}x^{5/2} + \frac{1}{3}x^3 + C.$

2. $280f(900) - 19f(90).$

3. (a) calories, (b) the total number of calories the player burns during the game