# Math 1496 - Sample Test 3

1. Using $n$ rectangles and the limit process, find the area under the given curve.

$$y = 3x - x^2 \text{ on } [1, 3]$$

2. Find the area bound by the following curves

$$y = x^2 \quad y = 2 - x, \quad x = 0, \quad x, y \geq 0.$$

3. Evaluate the following

$$(i) \ \frac{d}{dx} \int_1^x \sin\left(t^2\right) dt \quad (ii) \ \frac{d}{dx} \int_x^{x^2} \sqrt{1 + t^2} \, dt$$

4. Evaluate the following indefinite integrals

$$(i) \quad \int \sec^2 x \tan x \, dx \quad (ii) \ \int \frac{e^{1/x}}{x^2} \, dx \quad (iii) \ \int \frac{x}{(x+1)^2} \, dx$$

$$(i) \ \int_1^5 x\sqrt{x-1} \, dx \quad (ii) \ \int_0^{\pi/4} \sin x \cos x \, dx \quad (iii) \ \int_0^3 \frac{x}{\sqrt{x^2 + 16}} \, dx$$