Math 1452-006 Exam I 13 February 2015
Version A

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Work carefully. Do your own work. **Show all relevant supporting steps!**

Directions: For each problem construct an integral which solves the given problem. Do **NOT** expend time evaluating the constructed integrals

1. (10 pts) Find the area of the bounded region bounded between the curves
$$y = f(x) = 4x - x^2,\ y = g(x) = 2x - 3$$

2. (15 pts) Let *R* be the region in the first quadrant bounded between the curves
$$y = f(x) = \frac{4}{1+x},\ x\text{-axis},\ 0 \le x \le 3$$

   A. Find the volume of the solid of revolution generated by revolving *R* about the *x*-axis
   B. Find the volume of the solid of revolution generated by revolving *R* about the *y*-axis

3. (10 pts) Find the area enclosed in one loop of the lemniscate given by
$$r^2 = 9\cos 2\theta$$

4. (10 pts) Find the length of the curve given by $y = f(x) = x\sin x,\ 0 \le x \le \pi$.

5. (10 pts) Find the area of the region bounded between the curves
$$y = f(x) = x^2 - 3x,\ y = g(x) = 3 - x,\ -1 \le x \le 5$$

6. (15 pts) Let *R* be the bounded region in the first quadrant bounded between the curves
$$y = f(x) = \frac{x^3}{2},\ y = g(x) = 2x$$

   A. Find the volume of the solid of revolution generated by revolving *R* about the *x*-axis
   B. Find the volume of the solid of revolution generated by revolving *R* about the *y*-axis

7. (15 pts) Find the surface area of the surface generated by revolving the arc given by $y = f(x) = e^{-x},\ 0 \le x \le 2$ about

A. x-axis

B. y-axis

8. (10 pts) Find the area of the region bounded between the curves $x = y + 2,\ x = y^2 + 2y$

9. (15 pts) Let R be the bounded region in the first quadrant bounded between the curves $x^2 + y^2 = 4,\ x + y = 2$

A. Find the volume of the solid of revolution generated by revolving R about the line $y = -1$

B. Find the volume of the solid of revolution generated by revolving R about the line $x = 6$