Math 1452-006 Exam I 16 February 2015

Make-up

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 $y = f(x) = -x^2 + 3x + 3,\ y = g(x) = 2x - 3$

2. (15 pts) Let R be the region in the first quadrant bounded between the curves $y = f(x) = x^3 - 3x^2 - x + 8,\ x\text{-axis},\ 0 \le x \le 3$

   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 inside the cardioid $r = f(\theta) = 4 + 4\cos\theta$ but outside of the circle $r = g(\theta) = 2$

4. (10 pts) Find the length of the curve given by $y = f(x) = \sin(x)\,\mathrm{e}^{-2x},\ 0 \le x \le \pi/2$.

5. (10 pts) Find the area of the region bounded between the curves $y = f(x) = x^2 - 3x - 2,\ y = g(x) = \frac{1}{4}x + 1,\ -2 \le x \le 4$

6. (15 pts) Let R be the bounded region in the first quadrant bounded above by $y = f(x) = 3 - x$ and below by $g(x) = x^3 + x$

   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 $y = f(x) = \sin x,\ 0 \le x \le \pi$ about

A. x-axis
B. y-axis

8. (10 pts) Find the area of the region bounded between the curves $x = 2y + 6,\ x = y^2 + 3y$

9. (15 pts) Let R be the bounded region in the first quadrant bounded between the curves $x^2 + y^2 = 9,\ x + y = 3$

A. Find the volume of the solid of revolution generated by revolving R about the line $y = 7$
B. Find the volume of the solid of revolution generated by revolving R about the line $x = -9$