Math 1452-006 Exam II 13 March 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!**

Part I. Do 2 of the following 3 problems. Set up integrals which solve the problems, but do NOT expend time computing the numerical values of these integrals

1. (12.5 pts) Figure 1 gives the vertical cross-section of tank which contains sea water (weight density = 64.0 lbs/ft$^3$), with depth 3 feet. Find the fluid force against the end of the tank.

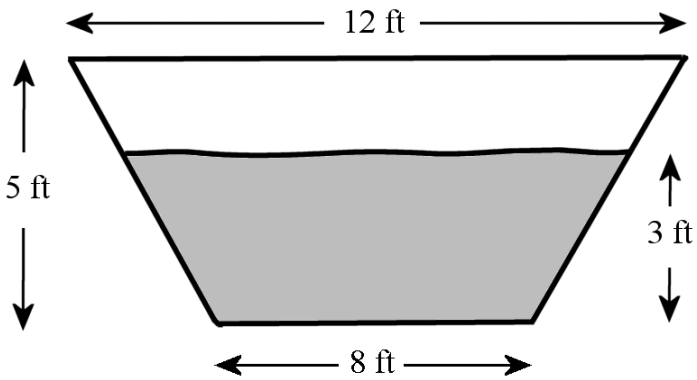

Figure 1

2. (12.5 pts) Figure 2 shows a trough which contains sea water (weight density = 64.0 lbs/ft$^3$), with depth 8 feet. How much work is done in pumping the sea water to the top of the trough?

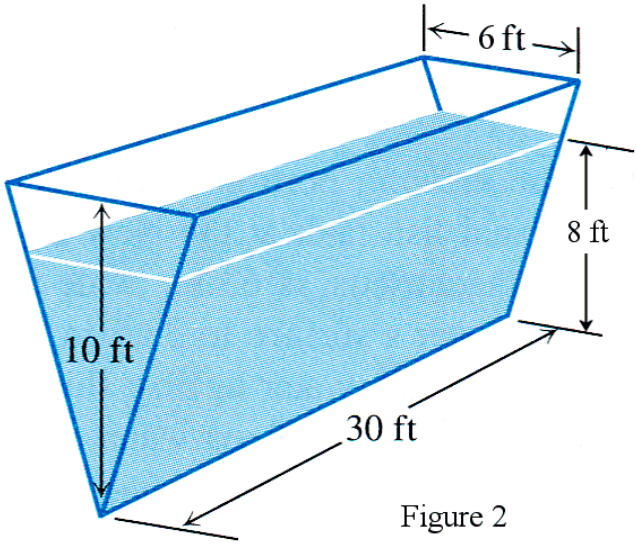

Figure 2

3. (12.5 pts) Find the coordinates of the centroid of the bounded region in the first quadrant bounded between the curves $y = x^2 + x,\ y = 0,\ x = 2$.

Part II. Do 8 of the following 9 problems

For each of the following problems find the value of the integral

4. (10 pts) $\int \frac{e^x}{3-4e^x}\,dx$

5. (10 pts) $\int 6x\,e^{2x}\,dx$

6. (10 pts) $\int \sin^3 2x\,\cos^4 2x\,\,dx$

7. (10 pts) $\int \frac{\sqrt{4+x^2}}{x^4}\,dx$

8. (10 pts) $\int \frac{x^2+2x-9}{(x+1)^2(x-4)}\,dx$

9. (10 pts) $\int \frac{2x-12}{(x+1)(x^2+4x+5)}\,dx$

10. (10 pts) $\int \ln(2x+3)\,dx$

11. (10 pts) $\int_0^{\pi/3} \cos^2(6x)\,dx$

12. (10 pts) $\int_3^6 \frac{3x}{\sqrt{x-2}}\,dx$