MATH 1352-001 Exam I July 21, 2000

Answer the problems on separate paper. You do <u>not</u> need to rewrite the problem statements on your answer sheets. Do your own work. Show all relevant steps which lead to your solutions. *Retain* this question sheet for your records.

1. Find the area bounded between the curves $y = 2x^2 - 6x + 4$ and $y = 4 - x^2$ and between $x = 0$ and $x = 3$.

2. Set up (<u>but do not evaluate</u>) an integral to find the volume of the solid of revolution obtained by revolving the region R about the given axis.

   R: the region bounded between the curves $y = \dfrac{x}{x+1}$ and $y = 0$ and between $x = 0$ and $x = 2$.

   axis: the y-axis

3. Set up (<u>but do not evaluate</u>) an integral to find the volume of the solid of revolution obtained by revolving the region R about the given axis.

   R: the region bounded between the curves $y = \dfrac{x+1}{x}$ and $y = 0$ and between $x = 2$ and $x = 5$.

   axis: the line $y = 4$

4. Find the surface area of the surface of revolution obtained by revolving the arc $y = \dfrac{\sqrt{11}}{2} x^2$ between $x = 0$ and $x = 3$ about the y-axis.

5. Set up (<u>but do not evaluate</u>) an integral to find the work done in pumping the water out a cylindrical storage tank. The radius of the tank is 3 feet and the height of the tank is 7 feet. The depth of the water in the tank is 5 feet. The water is to be pumped to an outlet value which is located 1 foot below the top of the tank. (Weight density for the water is $\rho = 62.4$).

6. Set up (<u>but do not evaluate</u>) an integral to find the total force against the face of a dam. The dam is trapezoidal in shape. The top of the dam is 200 feet in length and the base of the dam is 100 feet in length. The dam is 50 feet tall and the water behind the dam comes half way up the face of the dam. (Weight density for the water is $\rho = 62.4$).

7. Evaluate the following integral: $\int x\, e^{4x}\, dx$

8. Evaluate the following integral: $\int x\,(1+x)^2\, dx$

9. Evaluate the following integral: $\displaystyle\int \frac{1}{x^2\sqrt{x^2+16}}\, dx$

10. Evaluate the following integral: $\int \ln(\sin x)\cos x\, dx$