Math 19B May 5, 2000
Calculus for Science, Engineering, and Mathematics
Spring 2000, UCSC

MIDTERM

Time: 70min

1. Integrate:

a) $\displaystyle\int_0^{\pi/2} \cos^3\theta\, d\theta$ **b)** $\displaystyle\int_1^e (\ln x)^2\, dx$

c) $\displaystyle\int \frac{x}{x^2-5x+6}\, dx$ **d)** $\displaystyle\int \sqrt{4-x^2}\, dx$

2. **a)** Set up an integral corresponding to the area of the region bounded by the curves: $y=\sqrt{1+x^3}$, $y=1-x$, and $x=2$. **b)** Find a numerical estimate for this integral using a Reimann sum with 4 subdivisions.

3. Compute the volume of a sphere of radius r.

4. Suppose that, on a certain day, from noon to 3 pm the average temperature was 60°, from 3 to 4 pm the average temperature was 48°, and from 4 to 6 pm the average temperature was 30°. Use integrtals to find the average temperture from noon untill 6 pm.

5. A circular swimming pool has diameter 24 ft, the sides are 5 ft high, and the depth of the water is 4 ft. How much work is required to pump all of the water over the side? (Suppose, for convenience, that water weighs 1 lb/ft^3, and also that the gravitational constant $g=1$).

The first problem is worth 40 *points (*10 *points for each part), and the rest are* 15 *points each.*

LaTeX ..... MG