

MATH 181
Sample exam problems for the 1st hour exam
Fall 2009

1. Compute the definite integral:

$$\int_1^5 \left(\frac{17}{x} + 3 \right) dx$$

2. Consider the function $f(x) = 2x - x^2$ on the interval $[0, 2]$. Compute the trapezoid and midpoint approximations T_2 and M_2 .
3. The region enclosed by the graphs of the functions $y = x$ and $y = \sqrt{x}$ from $x = 0$ to $x = 1$ is rotated about the y -axis. Compute the volume of the resulting solid.
4. Compute the following integrals:

$$\int \sin^2 x \cos^3 x dx, \quad \int \frac{1}{\sqrt{4-x^2}} dx$$

5. Compute the following integrals:

$$\int \frac{x}{\sqrt{x-2}} dx \quad \int \arctan x dx$$

6. Compute the following integrals:

$$\int x^3 \sin(x^2) dx \quad \int \frac{1}{x^2 + x - 6} dx$$

7. Compute the following integrals:

$$\int \frac{1}{x^2 + 2x + 3} dx \quad \int x^6 \ln x dx$$

8. Compute the following integrals:

$$\int \cos(\sqrt{x}) dx \quad \int x^2 e^{2x} dx$$

9. Compute the area enclosed between the graphs $y = 1 - x^2$ and $y = 3 - 3x$.
10. A round hole of radius b is drilled through the center of a hemisphere of radius a ($b < a$). Find the volume of the portion of the sphere that remains.
11. Calculate the work against gravity required to build a solid tower 20 feet high with a square base 10 feet on each side using a material with density 90 lb/ft³.