

YOUR NAME: \_\_\_\_\_

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Find the area of the region enclosed by the graphs of the functions  $f(x) = x^3 - 3x^2$  and  $g(x) = 18x$ .

2. Find the volume of the solid resulting by rotating the region enclosed by the graphs of  $y = e^{-x}$ ,  $y = \frac{1}{e}$  and  $x = 0$  about the  $x$ -axis.

- Use cylindrical shells to find the volume of the solid resulting by rotating the region in the first quadrant bounded by  $x = y^2$ ,  $x = 2 - y$  and  $y = 0$  about the line  $y = -1$ .

4. Compute the integral  $\int \frac{\ln x}{\sqrt{x^5}} dx$ .

5. Compute the integral  $\int \cos^2 x \sin^3 x dx$ .