## EXAM 2 - MATH 152 YOUR NAME:

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 work needed to empty the tank shown below from the top if it is full with a liquid of density  $\rho$ . Assume that the acceleration of gravity is g.



2. Use substitution to evaluate the integral  $\int \frac{\ln(\ln x) \ln x}{x} dx$ . (**Hint:** By-parts is also involved!) 3. Evaluate the integral  $\int \sin 4x \cos 2x dx$ .

4. Use trigonometric substitution to evaluate the integral  $\int \frac{1}{\sqrt{25x^2+4}} dx$ . (**Hint:** You might need  $\int \sec \theta d\theta = \ln |\tan \theta + \sec \theta| + C$ .) 5. Explain in a short and precise phrase why the following integral is improper:  $\int_{3}^{7} \frac{x}{\sqrt{x-3}} dx$ . Then determine whether the integral converges and, if yes, evaluate its value.