Problem 1. Let $R$ be the region in the $xy$-plane bounded by the line $y = 2x$ and the parabola $y = x^2$.

A. Find the area of $R$.

B. Find the volume of the solid of revolution generated by revolving $R$ around the $x$-axis.

C. Find the volume of the solid of revolution generated by revolving $R$ around the $y$-axis, using the method of shells.

Problem 2. The vertical cross sections of a tank are isosceles triangles, as pictured below. If the tank is filled with water, find the fluid force against the end of the tank. (The weight density of water 62.4 pounds per cubic foot).

![Isosceles Triangle Diagram](image)

Problem 3. A tank has the shape of an inverted cone (i.e., point downwards). The top of the tank has a radius of 5 feet, and the height of the tank is 10 feet. If the tank is full of water, how much work is required to pump all of the water to a point 5 feet above the top of the tank? Give your answer to the nearest foot-pound. The weight density of water is 62.4 pounds per cubic foot.
Problem 4. Find the following integrals.

A. \[ \int x\sqrt{x + 1} \, dx \]

B. \[ \int x \sin(2x) \, dx \]

C. \[ \int x^2 \ln(x) \, dx \]

D. \[ \int \tan^{-1}(x) \, dx \]
EXAM

Exam 1, Version 1
Math 1352, Spring 2010
February 18, 2010

- Write all of your answers on separate sheets of paper. You can keep the exam questions when you leave. You may leave when finished.
- You must show enough work to justify your answers. Unless otherwise instructed, give exact answers, not approximations (e.g., $\sqrt{2}$, not 1.414).
- This exam has 4 problems. There are 220 points total.

Good luck!