Practice Test IV B for Math 1501, Calculus I

Problem 1: A solid is generated by rotating a square of sidelength a about its diagonal. Compute its volume.

Problem 2: Find the volume of one of the smaller wedges that is cut from a spherical shell of inner radius $1/2$ and outer radius 1 by two planes that meet at a diameter with an angle $\pi/6$.

Problem 3: Compute the volume of the solid that is generated by rotating the triangle with vertices $(1,1),(2,1)$ and $(1,2)$ about the x–axis.

Problem 4: A tank in the form of a half sphere of radius 5m is sitting on a pole of height 10m. How much work is needed to fill the tank with water? (Use $g = 10\text{m/s}^2$.)

Problem 5: Compute the following integrals.

$$\int_0^2 \frac{x}{\sqrt{x+1}}\mathrm{d}x$$

$$\int \frac{\ln x}{x^2}\mathrm{d}x$$

$$\int_1^2 \frac{\ln x}{x}\mathrm{d}x$$

$$\int_0^\pi \sin^2 x \cos^2 x$$

$$\int_0^{\ln 2} \frac{e^x}{1+e^x}\mathrm{d}x$$