PRACTICE MIDTERM 1

Problem 1. Water is leaking out of a tank at a rate of $r(t)$ liters per minute, where:

$$r(t) = \frac{2t}{t^2+3}.$$

How much water leaks out of the tank after the first 60 minutes?

Problem 2. (a.) Find the antiderivative:

$$\int \cos(x)\sqrt{1+\sin(x)}dx.$$

(b.) Evaluate the definite integral:

$$\int_0^{2\pi} x^2 \sin(x) dx.$$

Problem 3. Find the volume of the solid of revolution given by rotating the region bounded by $y = 4x$ and $y = x^2$ around the x-axis.

Problem 4. Find the area between the polar curve $r = f(\theta)$ and the origin for $0 \leq \theta \leq \pi/2$ where

$$f(\theta) = \sqrt{\arctan(x)}.$$