1. Use FTC or geometry to evaluate each integral:

(a) $\displaystyle\int_1^2 \frac{x^2+1}{x}\,dx$

(b) $\displaystyle\int_0^{\pi/3} \sec^2 x\,dx$

(c) $\displaystyle\int_0^3 \sqrt{6x-x^2}\,dx$ Hint: Complete the square and graph $y = \sqrt{6x-x^2}$

2. Suppose a gauge at the outflow of a reservoir measures the flow rate of water $r(t)$, in ft^3/min, at t minutes since the valve is open.

(a) In one sentence, explain what the following integral represents: $\displaystyle\int_2^6 r(t)\,dt$

(b) Suppose now the flow rate is given by the function $r(t) = \begin{cases} 50t & \text{if } 0 \le t \le 4 \\ 200 & \text{if } 4 < t \le 10 \end{cases}$ Graph this function.

(c) With the function $r(t)$ from part (b), find the total amount of water that flows out of the reservoir in the interval $[0, 10]$ minutes.