1. Evaluate the following integrals. (25 pts each)

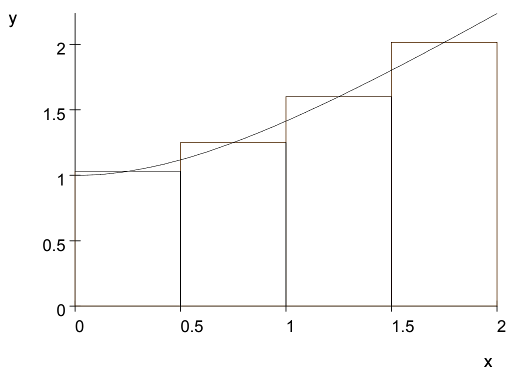
(a) $\int_0^3 x^2 - 2x + 4\ dx = \left(\frac{x^3}{3} - x^2 + 4x\right)\Big|_0^3 = (9 - 9 + 12) - (0) = 12$

(b) $\int_1^{e^2} \frac{3x + x^3}{x^2} dx = \int_1^{e^2} \frac{3}{x} + x\ dx = 3\ln(x) + \frac{x^2}{2}\Big|_1^{e^2} = \underbrace{\left(3\ln\left(e^2\right) + \frac{\left(e^2\right)^2}{2}\right) - \left(3\ln 1 + \frac{1}{2}\right)}_{\text{This answer is acceptible}} =$

$\frac{11}{2} + \frac{e^4}{2}$

NOTE: All work must be shown.

2. Estimate (3 decimal places): $\int_0^2 \sqrt{1+x^2}\ dx$ using 4 *midpoint rectangles.* (30 pts) The following graph and table may be useful:



$i =$	1	2	3	4
m_i	0.25	0.75	1.25	1.75
$f(m_i)$	1.031	1.250	1.601	2.016

Here $\Delta x = 0.5$, and we have

$$\int_0^2 \sqrt{1+x^2}\ dx \approx 0.5\,(1.031 + 1.250 + 1.601 + 2.016)$$
$$= 0.5(5.898) = 2.949.$$

(Here also, all work must be shown, but students don't have to use the table provided.)

3. Let $F(x) = \int_2^{x^4} \ln(1+2t)\ dt$. Find $F'(x)$. (20 pts)

$F'(x) = \underbrace{\ln(1 + 2\left(x^4\right)) \cdot 4x^3 = 4x^3 \ln\left(1 + 2x^4\right)}_{\text{either answer correct}}.$