MTH 261, Quiz #10, Spring 2024 Name KEY

Instructions: You must show all work to receive full credit for the problems below. You may check your work with a calculator, but answers without work will receive minimal credit. Use exact answers unless the problem starts with decimals or you are specifically asked to round.

1. Approximate the area under the curve $f(x) = x^2 + 2$ on the interval $[0,3]$, using 6 rectangles (using the right-hand rule).

$\Delta x = \frac{3-0}{6} = \frac{1}{2}$ $x_0 = 0,\ x_1 = 0.5,\ x_2 = 1,\ x_3 = 1.5,\ x_4 = 2,\ x_5 = 2.5,\ x_6 = 3$

$A_i = f(x_i)\Delta x$

$A \approx \sum f(x_i)\Delta x = \frac{1}{2}[0.5^2+2 + 1^2+2 + 1.5^2+2 + 2^2+2 + 2.5^2+2 + 3^2+2] =$

$\frac{1}{2}(2)(6) + \frac{1}{2}[0.5^2 + 1^2 + 1.5^2 + 2^2 + 2.5^2 + 3^2] =$

$6 + 11.375 = 17.375$

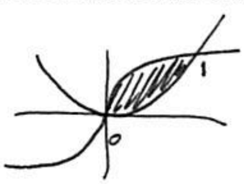
2. Integrate $\int_1^2 2x + \frac{e}{x}\,dx$.

$x^2 + e\ln x \Big|_1^2 = 2^2 + e\ln 2 - 1^2 - \cancel{e\ln 1}^{\,0}$

$3 + e\ln 2$

3. Find the area between the curves $f(x) = x^2$ and $g(x) = \sqrt[3]{x}$, for positive values of x. Sketch the graph.

$\int_0^1 x^{1/3} - x^2\,dx = \frac{3}{4}x^{4/3} - \frac{1}{3}x^3 \Big|_0^1 =$



$\frac{3}{4}(1)^{4/3} - \frac{1}{3}(1) - 0 + 0 = \frac{3}{4} - \frac{1}{3} = \frac{5}{12}$