MATH 110 Problem Set 4.2

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The following problems based on Section 4.2 of the textbook will help you study. *You do not need to hand in solutions to these problems.*

1. (Based on 4.2.21–25) Use the definition of a definite integral to evaluate the following integrals.

   (a) $\displaystyle\int_1^4 (x^2 + 2x - 5)\, dx$

   (b) $\displaystyle\int_0^5 (1 + 2x^3)\, dx$

2. (Based on 4.2.44) Use the properties of integrals and the result $\displaystyle\int_2^5 x^4\, dx = 618.6$ to evaluate $\displaystyle\int_2^5 (1 + 3x^4)\, dx$.

3. (Based on 4.2.29–30) Express the integral $\displaystyle\int_0^{2\pi} x^2 \sin x\, dx$ as a limit of Riemann sums. Do not evaluate.

4. (Based on 4.2.17–20) Express the limit as a definite integral on the given interval.

   (a) $\displaystyle\lim_{n\to\infty} \sum_{i=1}^n \frac{\cos x_i}{x_i} \Delta x$, $[\pi, 2\pi]$

   (b) $\displaystyle\lim_{n\to\infty} \sum_{i=1}^n [4 - 3(x_i^*)^2 + 6(x_i^*)^5]\Delta x$, $[0, 2]$

5. (Based on 4.2.35–40) Evaluate the following integrals by interpreting them in terms of areas.

   (a) $\displaystyle\int_{-2}^2 \sqrt{4 - x^2}\, dx$

   (b) $\displaystyle\int_{-1}^3 (3 - 2x)\, dx$

   (c) $\displaystyle\int_0^{10} |x - 5|\, dx$

6. (Based on 4.2.28) Show that $\displaystyle\int_a^b x^2\, dx = \frac{b^3 - a^3}{3}$.

You may find the following additional exercises helpful.

4.2 C-level: 1–8, 17–30, 33–51;
     B-level: 52–64;
     A-level: 65–75