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Calculus 1 Assignment-10
Section: 04
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7. A table of values of an increasing function f is shown. Use the table to find the lower and upper bound estimates of $\int_{10}^{30} f(x)dx$

x	10	14	18	22	26	30
$f(x)$	−12	−6	−2	1	3	8

$$Lower = 4 \times (-12 + -6 + -2 + 1 + 3) = -64$$

$$Upper = 4 \times (-6 + -2 + 1 + 3 + 8) = 16$$

11. Use the Midpoint Rule with the given value of n to approximate the integral. Round the answer to four decimal places.

$$\int_0^8 \sin\sqrt{x}\ dx, n = 4$$

$$\Delta x = \frac{8-0}{4} = 2$$

$$\int_0^8 \sin\sqrt{x} \approx 2 \times (f(\frac{2+0}{2}) + f(\frac{4+2}{2}) + f(\frac{6+4}{2}) + f(\frac{8+6}{2})) \approx 6.1820$$

19. Express the limit as a definite integral on the given interval.

$$\lim_{n\to\infty} \Sigma_{i=1}^{n} \frac{\sin x_i}{1+x_i} \Delta x, [0, \pi]$$

$$\lim_{n\to\infty} \Sigma_{i=1}^{n} \frac{\sin x_i}{1+x_i} \Delta x = \int_0^{\pi} \frac{sinx}{1+x} dx$$

23. Show that the definite integral is equal to $\lim_{n\to\infty} R_n$ and then evaluate the limit.

$$\int_0^4 (x - x^2)dx, R_n = \frac{4}{n}\Sigma_{i=1}^{n}[\frac{4i}{n} - \frac{16i^2}{n}]$$

$$\Delta x = \frac{4-0}{n} = \frac{4}{n}$$

$$x_i = \frac{4i}{n}$$

According to Riemann Sum:

$$\int_0^4 (x - x^2)dx = R_n = \frac{4}{n}\Sigma_{i=1}^n[\frac{4i}{n} - \frac{16i^2}{n}]$$

$$R_n = \frac{4}{n}\Sigma_{i=1}^n[\frac{4i}{n} - \frac{16i^2}{n}] = \frac{4}{n}\Sigma_{i=1}^n\frac{4i}{n} - \frac{4}{n}\Sigma_{i=1}^n\frac{16i^2}{n}$$

$$\frac{4}{n}\Sigma_{i=1}^n\frac{4i}{n} - \frac{4}{n}\Sigma_{i=1}^n\frac{16i^2}{n}$$