CALCULUS
The Integral Mean Value Theorem
NEW

NEW 0640-1. Find $\int_1^4 (8x^3 + 4x)\,dx$.

NEW 0640-2. Find $\int_1^4 (8x^3 + 4x)\,dx$.

NEW 0640-3. Find the average value of $8x^3 + 4x$ on $1 \leq x \leq 4$.

NEW 0640-4. Find the average value of $3(8x^3 + 4x)$ on $1 \leq x \leq 4$.

NEW 0640-5. Find the average value of $3(8x^3 + 4x) - 7$ on $1 \leq x \leq 4$.

NEW 0640-6. Find the average value of

$$3e^{2x} - 4x \text{ on } 0 \leq x \leq 8.$$

NEW 0640-7. Find $\int_2^{2+\pi} \cos^2 x \, dx$.

Hint: $\cos^2 x = \dfrac{1 + \cos(2x)}{2}$.

NEW 0640-8. Find $\int_3^{3+(3\pi/7)} \cos^2(7x - 1) \, dx$.

NEW 0640-9. A metal cable is 4 feet long. We measure and find that, for any $x \in [0, 4]$, its density x feet from the left endpoint of the cable is $3x^5 + 2$ lbs/foot. Find the average density of the cable.

0640-10. NEW Suppose f is continuous and

$$\int_1^8 f(x)\,dx = 21.$$

What value *MUST* any such function f attain on the interval $[1, 8]$?

0640-11. NEW A particle is traveling on a straight line in a coordinate plane, with constant velocity, and its position at time t is

$$(\quad 3t-1 \quad , \quad 4t-5 \quad) \quad .$$

a. Find its distance to $(5, 3)$ at time $t = 1$.

b. Find its distance to $(5, 3)$ at an aribtrary time t.

c. Find its AVERAGE distance to $(5, 3)$ between time $t = 0$ and time $t = 8$.