CALCULUS
The Integral Mean Value Theorem
OLD

OLD 0640-1. Find $\int_1^4 (5x^2 - x)\,dx$.

OLD 0640-2. Find $\int_1^4 (5x^2 - x)\,dx$.

OLD 0640-3. Find the average value of $5x^2 - x$ on $1 \leq x \leq 4$.

OLD 0640-4. Find the average value of $4(5x^2 - x)$ on $1 \leq x \leq 4$.

OLD 0640-5. Find the average value of $4(5x^2 - x) + 8$ on $1 \leq x \leq 4$.

0640-6. Find the average value of e^{x+4} on $0 \le x \le 3$.

OLD

0640-7. Find $\int_0^{2\pi} \sin^2 x \, dx$.

OLD

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

0640-8. Find $\int_0^{2\pi/7} \sin^2(7x - 1) \, dx$.

OLD

0640-9. A metal cable is 5 feet long. We measure and find that, for any $x \in [0, 5]$, its density x feet from the left endpoint of the cable is $4x^3 + 1$ lbs/foot. Find the average density of the cable.

OLD

0640-10. Suppose f is continuous and
OLD

$$\int_2^5 f(x)\,dx = 12.$$

What value *MUST* any such function f attain on the interval $[2, 5]$?

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

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

a. Find its distance to $(4, 1)$ at time $t = 1$.

b. Find its distance to $(4, 1)$ at an aribtrary time t.

c. Find its AVERAGE distance to $(4, 1)$ between time $t = 0$ and time $t = 7$.