**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**February 10, 2012**

**A.P. Calculus 1, Mrs. Sulkes and Mrs. Duty**

**Mean Value Theorem for Integrals**

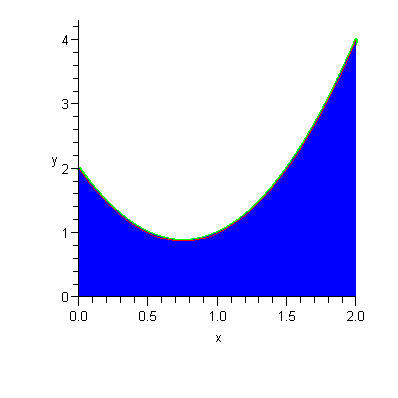
**Definition of Average Value:** If f is a continuous function on the interval [a,b], then the **average value** of *f* on the interval is



where is the **average value**.

**Problem 1:** A geometric interpretation of average value.

Find the area of the region bounded by the graph f(x) = 2x2 – 3x + 2, the x-axis and the lines x = 0 and x = 2. A sketch of the graph of f(x) is provided.



Find the height of a rectangle with width 2 such that its area is equal to the area bounded by the graph above. This height is called the **average value**.

**Problem 2:** Suppose that the acceleration of a particle moving along the x- axis is given by the equation , where is measured in seconds and the acceleration is measured in .

1. If the velocity of the particle at time = 0 is -3m/sec, write an equation for the velocity of the particle at any time.
2. If the position, of the particle on the x-axis at is 3, write an equation for the position of the particle at any time 
3. Calculate the average velocity of the particle on the interval 
4. Calculate 
5. Calculate 
6. At what time(s) is the particle at rest? You will need a calculator for this.
7. Determine the displacement of the particle over the time [0,4].
8. 
9. 
10. Determine the total distance traveled over the time [0, 4].
11. Using the position function.
12. Using the velocity function.

**The Mean Value Theorem for Integrals**

If f is a continuous function on the interval [a,b], then there exists a number c in the interval [a,b] such that



**Problem 3:** Find the average value of on the interval  and then find the value of that satisfies the Mean Value Theorem for Integrals..

