Name ___________________________

Unit 5: Average Value

Definition: Let **f** be a function which is continuous on the closed interval **[a, b]**.
The **average value** of ***f*** from **x = a** to **x = b** is the integral

Average Value: $\boxed{}$

Examples:

Find the average value of *f* on the given interval.

1. $f(x) = x^2 + 2x$ on [0,3]

2. $f(x) = \sin x$ on [0,pi]

3. $f(x) = e^x$ on [0,2]

4. $f(x) = \frac{1}{x}$ on [1,4]

Name ________________________

Unit 5: Mean Value Theorem for Integrals

REVIEW: **MVT for Differentiation**

If f is continuous on a closed interval [a,b] and differentiable on its interior (a,b),

then there is at least one number c in (a,b) where: $\frac{f(b)-f(a)}{b-a}=f'(c)$

Example: $f(x)=x^2-4x+5$ $\left[0,6\right]$

Mean Value Theorem for Integrals:

> If f is continuous on [a,b], then there exists a number c in [a,b] such that
>
> $\int_a^b f(x)dx=f(c)(b-a)$ OR f(c) = average value of f(x)

Examples:

1. Apply the MVT for Integrals for $f(x)=1+x^2$ on [-1,2]

2. Apply MVT for integrals for $f(x)=\sin x$ on [0,π].

3. Find the value of b such that the average value of $f(x)=2+6x-3x^2$ on the interval [0,b] equals 3.