Worksheet #30: The Limit of a Sum and The Definite Integral

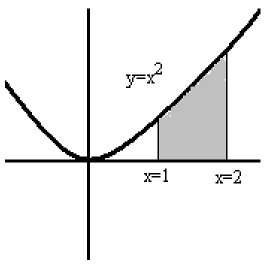
Useful Formula: If $f(x)$ is continuous on $[a,b]$, then the *Signed Area* $= \int_a^b f(x)dx = \lim_{n\to\infty}\sum_{k=1}^{n} f(x_k)\Delta x$.

The Signed Area = The Definite Integral = The Limit of the Sum with Equal Subintervals and Right Endpoints.

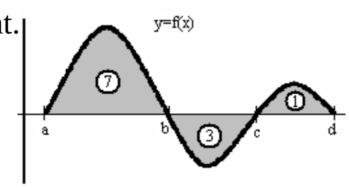
$\sum_{k=1}^{n} 1 = n$ $\sum_{k=1}^{n} k = \frac{n(n+1)}{2}$ $\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$ $\sum_{k=1}^{n} k^3 = \left[\frac{n(n+1)}{2}\right]^2$

1. Evaluate by rewriting as the limit of a sum with equal subintervals and right endpoints: $\int_1^2 x(2-x)dx$.

2. Setup a definite integral and find the area of the indicated region by rewriting it as a sum.



3. The areas of the various regions are indicated in the picture to the right. Evaluate the following integrals based on the function in the picture.



$\int_a^b f(x)dx =$ $\int_a^d f(x)dx =$

$\int_b^c f(x)dx =$ $\int_c^a f(x)dx =$