# MAT 202
Assignment 2
Monday, July 15, 2013

For full credit on these problems, each must be submitted with a complete and clear solution, showing all of your work. You may work with other classmates on these problems, but please indicate on your assignment if you received help. Partial answers and incomplete solutions may be eligible for some partial credit, depending on the level of completeness and demonstrated understanding.

1. Evaluate $\int_1^3 x^2\,dx$ using the limit definition, with *left* endpoints. Check your answer by evaluating the definite integral using the Fundamental Theorem of Calculus.

2. Use a geometric argument to evaluate each of the following integrals. A picture might help in your explanation.

    (a) $\int_1^5 4\,dx$

    (b) $\int_2^6 x\,dx$

    (c) $\int_a^b 2x\,dx$, where $0 < a < b$.

    (d) $\int_0^a \sqrt{a^2 - x^2}\,dx$, where $a > 0$.

    (e) $\int_0^3 |x - 1| + 2\,dx$

3. Suppose $\int_a^b f(x)\,dx = 3$ and $\int_a^b g(x)\,dx = 1$. Find

    (a) $\int_a^b f(x) + g(x)\,dx$

    (b) $\int_a^b 3f(x) + 2g(x)\,dx$

4. Consider the function $f(x) = x^3$ on the interval $[0, 2]$.

    (a) Find the average value of the function $f(x)$ over the interval $[0, 2]$.

    (b) Find the value $c \in [0, 2]$ such that $f(c)$ equals the value you found in part (a).

5. The following is the graph of the function $f(x)$.
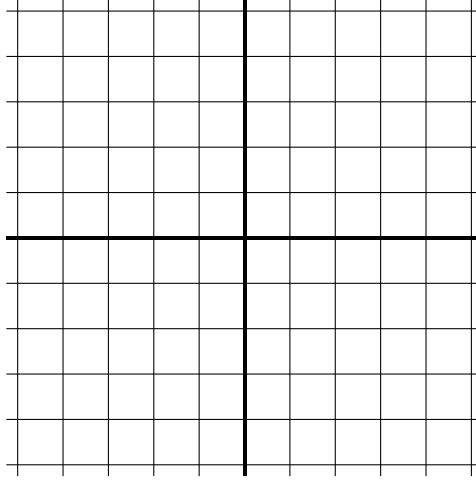
Let $F(x) = \int_{-5}^{x} f(t)\,dt$. Find the following values of the function $F(x)$.

x	-5	-4	-3	-2	-1	0	1	2	3	4	5
$F(x)$											

6. Evaluate the following definite integrals using the Fundamental Theorem of Calculus.

(a) $\int_1^4 x^3 + 3x - 2 + \sqrt{x}\,dx$

(b) $\int_0^{\pi/2} 3\sin x\,dx$

(c) $\int_1^3 \frac{1}{x}\,dx$