Instructions: Do the assigned reading and practice problems on your own. Then submit complete written solutions to the five graded problems during the discussion on 11/12/2015. No late homeworks will be accepted.

**Reading**: Sections 4.1 (Examples 1-3a), 4.2 (Examples 2-3), 4.3 (Examples 1-6)

**Practice Problems**:

4.1: 5a, 15, 17

4.2: 19, 31, 33, 35, 37, 53

4.3: 3, 7, 13, 19, 25, 29, 31, 33

**Graded Homework problems**:

1.) Let $f(x) = \cos^2(x)$. Approximate $\int_0^\pi f(x) \, dx$ using four rectangles with right endpoints.

b.) Write down an expression using sigma notation that would give the answer if 1000 rectangles were used. You do not have to evaluate the expression.

2.) a.) Evaluate

$$\lim_{n \to \infty} \frac{1}{n} \sum_{i=1}^{n} \left(1 + \frac{i}{n}\right)^3.$$

b.) Compute

$$\lim_{n \to \infty} \frac{1}{n} \left[ \sqrt{\frac{4n+3}{n}} + \sqrt{\frac{4n+6}{n}} + \sqrt{\frac{4n+9}{n}} + \ldots + \sqrt{\frac{4n+3(n-1)}{n}} + \sqrt{\frac{4n+3n}{n}} \right].$$

3.) a.) Argue by geometric reasoning that

$$\int_0^{2\pi} \sin^2(x) \, dx = \int_k^{k+2\pi} \sin^2(x) \, dx$$

for any value of $k$. A heuristic explanation is acceptable.

b.) Argue by geometric reasoning that

$$\int_0^{2\pi} \sin^2(x + c) \, dx = \int_c^{2\pi+c} \sin^2(x)$$
for any value of c. Again, a heuristic explanation is acceptable.

c.) Argue that
\[ \int_0^{2\pi} \sin^2(x) \, dx = \int_0^{2\pi} \cos^2(x) \, dx \]

d.) Compute \( \int_0^{2\pi} \sin^2(x) \, dx \) by considering \( \int_0^{2\pi} \sin^2(x) \, dx + \int_0^{2\pi} \cos^2(x) \, dx \)

4.) Evaluate the following integrals
\[
\int_0^1 x(\sqrt{x} - 1) \, dx \\
\int_{-\pi/4}^{\pi/4} \cos(\theta) + \sec^2(\theta) \, d\theta \\
\int_0^1 \frac{x^2 + 3x + 2}{x + 1} \, dx
\]

5.) Evaluate
\[
\int_{-3}^4 |x| + |x - 2| \, dx
\]