Homework Assignment for Week 11

Assigned Nov 23, 2005

1. Use the binomial expansion for $(k+1)^{\ell+1}$ to show by induction that

$$\lim_{n\to\infty}\frac{1}{n}\sum_{k=1}^{n}(\frac{k}{n})^{\ell}=\frac{1}{\ell+1}$$

   Hint: $(k+1)^{\ell+1}=k^{\ell+1}+(\ell+1)k^{\ell}+\cdots$

2. Section 5.2: Problems 34, 36, 38, 39, 46(Hint: Area of a circle = ?).

3. Section 5.2: In problem 38 and 39, take the uniform partition, rewrite the limit in terms of n and then express c_k in terms of n and k. See if you can still read the result as a definite integral. If you can't, try a few more from problems 35-42.

4. Evaluate

$$\lim_{n\to\infty}\sum_{k=1}^{n}\frac{\sqrt{k}}{n\sqrt{n}}$$

   Hint: Can you write it as $\int_a^b f(x)dx$, with a familiar f?

5. Section 5.3: Problems 2, 40, 45, 46.

6. Is 'The Mean Value Theorem for Definite Integrals' (Theorem 2, page 298) still valid without assuming f to be continuous? Explain.

7. Section 5.4: Problems: 6, 14, 20, 24, 42, 45, 50, 70, 74.