

Homework Assignment for Week 01

1. (s8.6-extra1)

Check if the improper integrals $\int_0^1 x^{-p} dx$ and $\int_1^\infty x^{-p} dx$ converge for the cases $p > 1$, $p = 1$ and $0 < p < 1$, respectively by direct evaluation. Then memorize the results.

2. Section 8.6: Problems: 7, 13, 21, 25, 31, 33, 34, 37, 38, 41, 51, 54, 55, 56, 58, 60, 64, 71, 73.

You may find it convenient to use Theorem 1 and Theorem 2 for almost all of the problems. Simply compare the integrand with one of the cases in Problem 1 above.

3. (s8.6-extra2)

For what values of $p > 0$ is $\int_0^{\frac{\pi}{2}} e^x \tan^p x dx$ convergent?

4. Section 9.1: Problems: 7, 41, 57, 59, 60, 65, 71, 72(abe).

5. Section 9.2: Problems: 14, 20, 33, 62, 63.

6. Section 9.3: Problems: 23, 24, 27, 39, 41, 47, 61, 62.

7. (s9.3-extra1)

Is $\sum_{n=1}^{\infty} \sin \frac{1}{n}$ convergent? How about $\sum_{n=1}^{\infty} (1 - \cos \frac{1}{n})$?

Hint: Try to compare it with $\sum \frac{1}{n^p}$. The key is to find the correct p first.