MAT136: Calculus II

Summer 2025

Preparation for Test 2

Instructions

The following questions are meant as extra practice for preparing for test 2 and are not meant to be marked.

1. In Planck's radiation law, we encounter the integral

$$I = \int_1^\infty \frac{dx}{x^5(e^{1/x} - 1)}.$$

   (a) Show that

$$e^t \geq 1 + t, \qquad \text{for all } t > 0.$$

   (b) Use the previous part along with a comparison test to determine if I converges or diverges.

2. Consider the integral

$$I = \int_{-\infty}^\infty \left[1 - \tanh^2(x)\right] e^x \, dx,$$