

Information on Math 5710.

Synopsis of topics on Taylor formula, integrals depending upon a parameter, improper and infinite integrals. Sect.31,32,33

Taylor formula (Theorem 31.5).

Integrals depending on a parameter (Theorems 31.6, 31.7, 31.8).

Improper and infinite integrals (Definitions 32.1, 32.2).

Cauchy criterion for convergence (Theorem 32.5).

Comparison test (Theorem 32.7). Limit comparison test (Theorem 32.8).

Dirichlet test (Theorem 32.9).

Uniform convergence of infinite integrals (Definition 33.1). Cauchy criterion (Theorem 32.2).

Weierstrass M-text (Theorem 33.3). Dirichlet test (Theorem 33.4).

Infinite integrals depending on a parameter (Theorems 33.6, 33.8). Examples.

Quiz problems - examples.

1. Explain why the following function

$$F(t) = \int_{t^2}^{t^3} \sin(xt) dx$$

is differentiable and find $F'(t)$.

2. Determine the values of p and q for which the following integrals converge or diverge.

(a) $\int_1^2 (x-1)^p (\ln x)^q dx$

(b) $\int_1^{+\infty} \frac{\cos x^2}{1+x^p} dx$

3. For what values of p the following integral is convergent? For what values is it absolutely convergent.

$$\int_{-1}^{+\infty} \frac{\sin x^p}{x} dx$$

4. For what values of α the gamma function

$$\Gamma(\alpha) = \int_0^{+\infty} e^{-x} x^{\alpha-1} dx$$

is continuous. Find $\Gamma(2)$.