

Calculus II

Homework on Lecture 9

1. Determine whether the integral is convergent or divergent. Motivate your answer.

(a) $\int_2^{\infty} \frac{1}{(x-1)^{\frac{3}{2}}} dx.$

(b) $\int_{-1}^1 \frac{1}{\sqrt[5]{1+x}} dx.$

(c) $\int_1^{\infty} \frac{1}{\sqrt[5]{1+x}} dx.$

(d) $\int_{-1}^{\infty} \frac{1}{\sqrt[5]{1+x}} dx.$

(e) $\int_{-\infty}^0 \frac{1}{2-3x} dx.$

(f) $\int_{-\infty}^0 \frac{1}{(2-3x)^2} dx.$

(g) $\int_{-\infty}^0 \frac{1}{(2-3x)^{1.00000001}} dx.$

(h) $\int_{-2}^{\frac{1}{2}} \frac{1}{2x-1} dx.$

(i) $\int_{-1}^{\infty} e^{-3x} dx.$

(j) $\int_{-\infty}^5 2^x dx.$

(k) $\int_{-\infty}^{\infty} x^3 dx.$

(l) $\int_{-\infty}^{\infty} x e^{-x^2} dx.$

(m) $\int_0^{\infty} \sqrt{x} e^{-\sqrt{x}} dx.$

(n) $\int_0^{\infty} \sin^2 x dx.$

(o) $\int_0^5 \frac{1}{x^2+x-2} dx.$

(p) $\int_0^{\infty} \frac{1}{x^2+x+1} dx.$

(q) $\int_2^{\infty} \frac{1}{x^2-x-1} dx.$

(r) $\int_0^{\infty} \frac{1}{x^2-x-1} dx.$

(s) $\int_{-\infty}^{\infty} \frac{x^2}{x^4+2} dx.$

(t) $\int_{100}^{\infty} \frac{1}{x \ln x} dx.$

(u) $\int_{100}^{\infty} \frac{1}{x(\ln x)^2} dx.$

(v) $\int_0^1 \ln x dx.$

(w) $\int_0^1 \frac{\ln x}{\sqrt{x}} dx.$

(x) $\int_0^2 x^3 \ln x dx.$

(y) $\int_0^1 \frac{e^{\frac{1}{x}}}{x^2} dx.$

(z) $\int_{-1}^0 \frac{e^{\frac{1}{x}}}{x^2} dx.$

2. Determine whether the integral is convergent or divergent. Motivate your answer. The answer key has not been proofread, use with caution.

(a) $\int_0^{\infty} \sin x^2 dx$ (This problem is more difficult and may re-

quire knowledge of sequences to solve).