Mathematics 170
Problem Worksheet No. 10
Wed. March 23 – Tues March 29

1. Evaluate the following integrals:

(a) $\int_0^1 \frac{x}{x^3+1}\,dx$

(b) $\int_1^{\sqrt{3}} \frac{x^3+1}{x^3+x}\,dx$

(c) $\int_3^8 \frac{x^2}{1+\sqrt{x+1}}\,dx$

2. Do the following improper integrals converge? If so, to what?

(a) $\int_0^\infty xe^{-2x}\,dx$ (b) $\int_{-\infty}^1 \frac{x}{x^2+4x+5}\,dx$

(c) $\int_{-\infty}^\infty f'(2x)\,dx$ if $f(x) = \frac{1}{x^2+1}$

Answers 1 (a) $-\frac{1}{3}\ln 2 + \frac{\sqrt{3}\,\pi}{9}$ (b) $\ln\left(\frac{\sqrt{3}}{\sqrt{5}}\right) - \frac{\pi}{12} + \sqrt{3} - 1$ (c) $\frac{1327}{30}$

2 (a) Converges to $\frac{1}{4}$ (b) diverges. (c) Converges to 0