MATH 2300 – Exam 1 Review Problems

§5.5: Suppose that $\displaystyle\int_0^5 f(x)\,dx = 10$. Evaluate $\displaystyle\int_0^{\sqrt{5}} 2x\,f(x^2)\,dx$.

§7.1: Find $\displaystyle\int_1^4 \sqrt{x}\,\ln x\,dx$.

§7.1: Find $\displaystyle\int e^x \sin x\,dx$.

§7.2: Find $\displaystyle\int \sec^4(x)\tan^3(x)\,dx$.

§7.3: Find $\displaystyle\int \frac{1}{x^2\sqrt{x^2+4}}\,dx$.

§7.4: Find $\displaystyle\int \frac{1}{x^2-4x+3}\,dx$.

§7.4: Set up the partial fraction decomposition for

$$\frac{4x^2+7x+3}{(5x+3)^3(x^2+1)(x+1)^2}.$$

You do not need to solve for the constants; simply express the decomposition in the proper form.

§7.7: Suppose f is continuous, decreasing, and concave down on $[2,8]$. Let L_4, R_4, T_4, M_4 denote the left-hand, right-hand, trapezoidal, and midpoint approximations to $\displaystyle\int_2^8 f(x)\,dx$, using 4 equal subintervals. Order these approximations from smallest to largest.

§7.8: Given that $\displaystyle\int_3^\infty \frac{1}{x^2+4}\,dx$ converges, use the Comparison Theorem to determine the convergence of $\displaystyle\int_3^\infty \frac{\sin^2 x}{x^2+4}\,dx$.

§7.8: Determine whether the following improper integral converges or diverges. If it converges, compute its value: $\displaystyle\int_2^4 \frac{1}{\sqrt{4-x}}\,dx$.

§7.8: Determine whether the following improper integral converges or diverges. If it converges, compute its value: $\displaystyle\int_0^{\pi/2} \tan x\,dx$.