Review: Chapter 7

Wednesday, April 29

Chapter 7: Integrals

7.1: Integration by Parts

1. $\int x \sin x$
2. $\int xe^x$
3. $\int \ln x$
4. $\int \arctan x$
5. $\int xe^{x^2}$
6. $\int x^3 \sin(x^2)$

7.2: Trig Integrals

1. $\int \sin^2 x$
2. $\int \sin x \cos x$
3. $\int \sin 2x \sin 4x$
4. $\int \tan x \sec^3 x$
5. $\int \cos^2 x \tan^3 x$
6. $\int \tan^3 x$

7.3: Trig Substitutions

1. $\int x^3\sqrt{1-x^2}$
2. $\int \dfrac{\sqrt{1+x^2}}{x}\,dx$
3. $\int \dfrac{1}{x^2\sqrt{x^2-1}}\,dx$
4. $\int \dfrac{x}{\sqrt{x^2+x+1}}$
5. $\int \sqrt{x^2+2x}$
6. $\int \dfrac{1}{\sqrt{x^2-6x+13}}$

7.4: Partial Fractions

1. $\displaystyle\int \frac{x}{1+x^2}$
2. $\displaystyle\int \frac{x+1}{x^2-1}$
3. $\displaystyle\int \frac{x^2+2x+1}{(x+3)^2}$
4. $\displaystyle\int \frac{x^2+3}{(x+1)(x+2)}$
5. $\displaystyle\int \frac{x+5}{(x+1)(x-2)^2}$
6. $\displaystyle\int \frac{x+1}{x^2+2x+2}$

7.7: Approximate Integration

1. Estimate the value of π by approximating $\int_0^1 \frac{1}{1+x^2}\,dx$ with the Midpoint, Trapezoidal, and Simpson's Rule with $n = 4$.
2. Put error bounds on each estimate.

7.8: Improper Integrals

Decide whether the following integrals converge or diverge. If the integral converges, evaluate it.

1. $\displaystyle\int_0^1 1/x^2\,dx$
2. $\displaystyle\int_0^\infty e^{-x}\,dx$
3. $\displaystyle\int_0^1 1/x\,dx$
4. $\displaystyle\int_0^2 1/\sqrt{x}\,dx$
5. $\displaystyle\int_1^\infty 1/\sqrt{x}\,dx$
6. $\displaystyle\int_1^\infty 1/x^2\,dx$
7. $\displaystyle\int_1^\infty \frac{1}{(x-1)x^2}\,dx$
8. $\displaystyle\int_0^1 \ln x\,dx$
9. $\displaystyle\int_2^4 1/\sqrt{|x-3|}$