MATH 1152Q Exam 2 Summary Chapter 7

[Chapter 7] Techniques of Integration

【7.4】Partial Fraction Decomposition

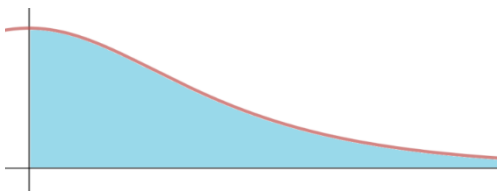
1. Find the partial fraction decomposition for $f(x)=\dfrac{1}{x^4+3x^2+2}$.
2. Find the partial fraction decomposition for $f(x)=\dfrac{20x}{(x-1)^2(x^2+1)}$. (Optional)
3. Express $\dfrac{2x^3+x^2-6x+7}{x^2+x-6}$ as a sum of polynomials and partial fractions.
4. Evaluate $\displaystyle\int\frac{\cos x}{\sin^3 x-4\sin x}\,dx$.
5. Evaluate $\displaystyle\int\frac{7x^2+4x-1}{(x-1)(4x^2+1)}\,dx$.

【7.7】Approximate Integrations (moved to Final Exam – will not be in Exam 2)

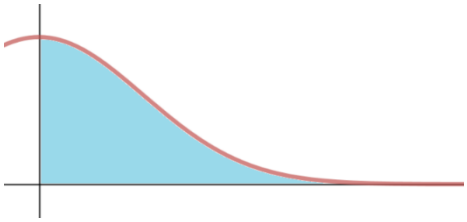
1. Consider the integral $\displaystyle\int_1^9\sqrt{\ln x}\,dx$.
   a. Use the **Midpoint Rule** with $n=4$ to approximate the integral.
   b. Use the **Trapezoidal Rule** with $n=4$ to approximate the integral.
   c. Use the **Simpson's Rule** with $n=8$ to approximate the integral.

【7.8】Improper Integrals

1. Let R be the region bounded by $y=\dfrac{e^x}{1+e^{2x}}$ and the x-axis for $x\geq 0$. Determine if the solid formed by revolving R about the x-axis has a finite volume. If it does, find that volume.



2. (For Final but not Exam 2) The region enclosed by the graph of $f(x)=e^{-x^2}$ and the x and y-axes for $0\leq x<\infty$ is **revolved around the y-axis** to form a solid or revolution. Determine whether or not this solid of revolution has a finite volume.



3. Evaluate $\int_0^{\frac{\pi}{2}} \sec^4 x \, dx$.

4. Evaluate $\int_{\frac{1}{e}}^{e} \frac{1}{x(\ln x)^2} \, dx$.

MATH 1152 Exam 2 Summary Ch 7 Answer

[Ch 7] Techniques of Integration

【7.4】Partial Fraction Decomposition

(1) $\frac{-1}{x^2+2}+\frac{1}{x^2+1}$ (2) $\frac{10}{(x-1)^2}+\frac{-10}{x^2+1}$ (3) $2x-1+\frac{4}{x+3}+\frac{3}{x-2}$

(4) $-\frac{1}{4}\ln|\sin x|+\frac{1}{8}\ln|\sin x-2|+\frac{1}{8}\ln|\sin x+2|+C$ (5) $2\ln|x-1|-\frac{1}{8}\ln(4x^2+1)+\frac{3}{2}\tan^{-1}(2x)+C$

【7.7】Approximate Integrations (Moved to Final Exam – not in Exam 2)

(1) (a) $2\left(\sqrt{\ln 2}+\sqrt{\ln 4}+\sqrt{\ln 6}+\sqrt{\ln 8}\right)$ (b) $\frac{2}{2}\left(\sqrt{\ln 1}+2\sqrt{\ln 3}+2\sqrt{\ln 5}+2\sqrt{\ln 7}+\sqrt{\ln 9}\right)$

(c) $\frac{1}{3}\left(\sqrt{\ln 1}+4\sqrt{\ln 2}+2\sqrt{\ln 3}+4\sqrt{\ln 4}+2\sqrt{\ln 5}+4\sqrt{\ln 6}+2\sqrt{\ln 7}+4\sqrt{\ln 8}+\sqrt{\ln 9}\right)$

【7.8】Improper Integrals

(1) The volume is $\frac{\pi}{4}$ cubic units. Hints: apply u-substitution once or twice. (2) (For final exam – not exam 2). The volume is π cubic units.

(3) The improper integral diverges. (4) The improper integral diverges.