

Exam One Review Problems

1. $\int \frac{(\ln x)^5}{5x} dx$

2. $\int \frac{2\sec^2 x}{1+\tan^2 x} dx$

3. $\int \frac{3x+5}{5x^2-4x-1} dx$

4. $\int \frac{1}{x^2\sqrt{16-x^2}} dx$

5. $\int \frac{x^2}{\sqrt{5+x}} dx$

6. $\int 10xe^{10x} dx$

7. $\int x^6 \ln x dx$

8. $\int \frac{x^2}{\sqrt{x^2+9}} dx$

9. $\int \frac{-2x^2+4}{x(x+1)(x+2)} dx$

10. $\int e^x \sin(4x) dx$

11. $\int \frac{1}{\sqrt{25x^2-49}} dx$

12. $\int \frac{2x}{x^2-6x+9} dx$

13. $\int \frac{6x}{x^2-x-2} dx$

14. $\int \sec^7 x \tan^3 x dx$

15. $\int \sec^4 x \tan^2 x dx$

16. $\int \sin^5 x \cos^2 x dx$

17. $\int \sin^4(x) dx$

18. $\int \frac{x^3}{\sqrt{x^2+1}} dx$

19. $\int \frac{\ln(x)}{x^5} dx$

20. $\int \frac{10}{(1+9x^2)^{\frac{3}{2}}} dx$

21. $\int x^8 \sqrt{4-x^6} dx$ (Tables)

22. $\int \frac{x^5}{\sqrt{49-x^4}} dx$ (Tables)

Find the **exact** value of the definite integral.

23. $\int_{-2}^0 xe^{-x^2} dx$

24. $\int_0^2 \frac{e^x}{1+e^{2x}} dx$

Write out the form of the partial fraction decomposition of the following functions. Then stop. **Do not find the numerical coefficients.**

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

26. $\frac{4x^2}{x^8 + 125x^5}$

27. $\frac{4x^2}{x^4(x^2 + x + 1)^2}$

Write out the form of the partial fraction decomposition of the following functions. **Determine the numerical values of the coefficients. Then stop.**

28. $\frac{x-1}{x(x+2)^2}$

29. $\frac{4x-2}{16x^4-1}$

Numerical Integration

30. Do the following for the given integral: $\int_0^1 15 \cos(x^2) dx$

(a) Estimate the integral, using the Trapezoidal Rule with $n = 4$. (Round your answer to six decimal places.)

(b) Estimate the integral, using the Midpoint Rule with $n = 4$. (Round your answer to six decimal places.)

31. Do the following for the given integral: $\int_0^\pi x^2 \sin(x) dx$, $n = 6$

(a) Estimate the integral, using the Midpoint Rule. (Round your answer to six decimal places.)

(b) Use the Simpson's Rule to approximate the given integral with the specified value of n . (Round your answer to six decimal places.)

Solutions

1. $\frac{(\ln x)^6}{30} + C$

2. $2x + C$

3. $-\frac{11}{15} \ln|5x+1| + \frac{4}{3} \ln|x-1| + C$

4. $-\frac{\sqrt{16-x^2}}{16x} + C$

5. $\frac{2}{15} \sqrt{x+5}(200-20x+3x^2) + C$

6. $\frac{1}{10}(10x-1)e^{10x} + C$

7. $\frac{x^7 \ln x}{7} - \frac{x^7}{49} + C$

8. $\frac{x\sqrt{x^2+9}}{2} - \frac{9}{2} \ln \left| \frac{x+\sqrt{x^2+9}}{3} \right| + C$

9. $2 \ln|x| - 2 \ln|x+1| - 2 \ln|x+2| + C$

10. $\frac{-4e^x \cos(4x)}{17} + \frac{1}{17} e^x \sin(4x) + C$

11. $\frac{1}{5} \ln \left| 5x + \sqrt{25x^2 - 49} \right| + C$

12. $2 \ln|x-3| - \frac{6}{x-3} + C$

13. $4 \ln|x-2| + 2 \ln|x+1| + C$

14. $\frac{\sec^9(x)}{9} - \frac{\sec^7(x)}{7} + C$

15. $\frac{\tan^5(x)}{5} + \frac{\tan^3(x)}{3} + C$

16. $-\frac{\cos^7(x)}{7} + \frac{2\cos^5(x)}{5} - \frac{\cos^3(x)}{3} + C$

17. $\frac{1}{4} \left(\frac{3}{2}x - \sin 2x + \frac{1}{8} \sin 4x \right) + C$

18. $\frac{1}{3} \sqrt{x^2+1} (x^2-2) + C$

19. $-\frac{1}{4} \frac{\ln(x)}{x^4} - \frac{1}{16x^4} + C$

20. $\frac{10x}{\sqrt{1+9x^2}} + C$

21. $\frac{1}{24} x^3 (2x^6 - 4) \sqrt{4-x^6} + \frac{2}{3} \sin^{-1} \frac{x^3}{2} + C$

22. $-\frac{x^2}{4} \sqrt{49-x^4} + \frac{49}{4} \sin^{-1} \frac{x^2}{7} + C$

23. $\frac{e^{-4}-1}{2}$

24. $\tan^{-1} e^2 - \frac{\pi}{4}$

25. $\frac{A}{x+1} + \frac{B}{x-2} + \frac{C}{(x-2)^2} + \frac{D}{(x-2)^3}$

26. $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{D}{x^4} + \frac{E}{x^5} + \frac{F}{x+5} + \frac{Gx+H}{x^2-5x+25}$

27. $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{D}{x^4} + \frac{Ex+F}{x^2+x+1} + \frac{Gx+H}{(x^2+x+1)^2}$

28. $A = -\frac{1}{4}; B = \frac{1}{4}; C = \frac{3}{2}$

29. $A = -4; B = 1; C = 1; D = 0$

30.

(a) 13.436383

(b) 13.633602

31.

(a) 5.982132

(b) 5.868274