Integration Review for Exam 2

For problems solved by trig substitution, write your final answers without expressions like $\sin(\arctan(x/3))$ but instead write $\frac{x}{\sqrt{x^2+9}}$.

Problems

1. $\int e^3\,dx$
2. $\int \frac{x+x^{2/3}}{x}\,dx$
3. $\int \sin^2 x+\cos^2 x\,dx$
4. $\int \sin^2 x\,dx$
5. $\int \ln x\,dx$
6. $\int \frac{x}{\sqrt{1+x^2}}\,dx$
7. $\int xe^x\,dx$
8. $\int e^x\cos x\,dx$
9. $\int_0^4 \frac{1}{\sqrt{x}(1+\sqrt{x})^2}\,dx$
10. $\int \sqrt[3]{8x^7}\,dx$
11. $\int \tan x\,dx$
12. $\int 3^x\cdot x^2\,dx$
13. $\int \frac{1}{x^2+2x}\,dx$
14. $\int \frac{1}{x-x\ln x}\,dx$
15. $\int \frac{\sin(27/x)}{35x^2}\,dx$
16. $\int \frac{e^{2x}}{e^{4x}+1}\,dx$
17. $\int \cos(\sqrt{x})\,dx$
18. $\int e^{e^x+x}\,dx$
19. $\int x^2\sin x\,dx$
20. $\int 3x\sec^2(4x)\,dx$
21. $\int \frac{1}{\sqrt{4x^2+9}}\,dx$
22. $\int_{\pi/6}^{\pi/2} \cos^3 x\,dx$
23. $\int \frac{x^2+x+1}{x+1}\,dx$
24. $\int \sec x\,dx$
25. $\int_0^{3\pi/2} \frac{\cos x}{2-\sin x}\,dx$
26. $\int \tan^3(x)\sec^5(x)\,dx$
27. $\int_{-1}^{0} \frac{9x^2+12x+7}{9x^2+12x+4}\,dx$
28. $\int \frac{2x+1}{(x+5)^{100}}\,dx$
29. $\int (x+3)^{75}(x+2)\,dx$
30. $\int \frac{\sqrt{1-(\ln x)^2}}{x}\,dx$
31. $\int \frac{\sec^2 x}{(1+\tan x)^2}\,dx$
32. $\int \frac{(1-x^2)^{3/2}}{x^6}\,dx$
33. $\int \tan^2 x\,dx$
34. $\int_0^2 \frac{1}{x^2-2x+2}\,dx$
35. $\int \cos(x)\cot(x)\,dx$
36. $\int_0^2 \sqrt{12-3x^2}\,dx$

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Answers

1. $xe^3 + C$
2. $\frac{x^2}{6} + x + C$
3. $x + C$
4. $\frac{1}{2}x - \frac{1}{4}\sin 2x + C$
5. $x \ln x - x + C$
6. $\sqrt{1 + x^2} + C$
7. $xe^x - e^x + C$
8. $\frac{1}{2}e^x(\sin x + \cos x) + C$
9. $\frac{4}{3}$
10. $\frac{3}{5}x^{10/3} + C$
11. $\ln|\sec x| + C$
12. $3^x\left(\frac{x^2}{\ln 3} - \frac{2x}{(\ln 3)^2} + \frac{2}{(\ln 3)^3}\right) + C$
13. $\frac{1}{2}\ln\left|\frac{x}{x+2}\right| + C$
14. $-\ln|1 - \ln x| + C$
15. $\frac{1}{945}\cos\left(\frac{27}{x}\right) + C$
16. $\frac{1}{2}\arctan(e^{2x}) + C$
17. $2\left(\sqrt{x}\sin\sqrt{x} + \cos\sqrt{x}\right) + C$
18. $e^{e^x} + C$
19. $-x^2\cos x + 2x\sin x + 2\cos x + C$
20. $\frac{3}{4}\left(x\tan 4x + \frac{1}{4}\ln|\cos 4x|\right) + C$
21. $\frac{1}{2}\ln\left|\frac{2}{3}x + \sqrt{1 + \frac{4}{9}x^2}\right| + C$
22. $\frac{5}{24}$
23. $\frac{1}{2}x^2 + \ln|x + 1| + C$
24. $\ln|\sec x + \tan x| + C$
25. $\ln\left(\frac{2}{3}\right)$
26. $\frac{1}{7}\sec^7 x - \frac{1}{5}\sec^5 x + C$
27. $-\frac{1}{2}$
28. $-\frac{1}{49(x+5)^{98}} + \frac{1}{11(x+5)^{99}} + C$
29. $\frac{1}{77}(x+3)^{77} - \frac{1}{76}(x+3)^{76} + C$
30. $\frac{1}{2}\arcsin(\ln x) + \frac{1}{2}\ln x\sqrt{1 - \ln^2 x} + C$
31. $-\frac{1}{1+\tan x} + C$
32. $-\frac{1}{5}\left(\frac{\sqrt{1-x^2}}{x}\right)^5 + C$
33. $\tan x - x + C$
34. $\frac{\pi}{2}$
35. $\cos x - \ln|\csc x - \cot x| + C$
36. $\pi\sqrt{3}$