Part I: Evaluate the following indefinite integrals.

1. $\displaystyle\int \frac{3}{x(\ln(x))^4}\,dx$
2. $\displaystyle\int \frac{4e^{3x}}{4+e^{3x}}\,dx$
3. $\displaystyle\int \frac{8x}{x^2+4}\,dx$
4. $\displaystyle\int \sqrt{3x^2+6x}(x+1)\,dx$
5. $\displaystyle\int \frac{8x}{(x^2+2)^2}\,dx$
6. $\displaystyle\int \frac{3}{x(\ln(x)+4)^4}\,dx$
7. $\displaystyle\int \frac{x-3}{5-6x+x^2}\,dx$
8. $\displaystyle\int \frac{\sqrt[3]{3+\ln(x)}}{x}\,dx$
9. $\displaystyle\int \cos(x)(2-\sin(x))^4\,dx$
10. $\displaystyle\int \frac{\sec^2(x)}{1+2\tan(x)}\,dx$
11. $\displaystyle\int \frac{x+4}{\sqrt[4]{x^2+8x}}\,dx$
12. $\displaystyle\int 9x^2\sqrt{x^3+1}\,dx$
13. $\displaystyle\int \frac{e^{2x}+x}{\sqrt{e^{2x}+x^2}}\,dx$
14. $\displaystyle\int \frac{(2+3\ln(x))^5}{x}\,dx$
15. $\displaystyle\int \frac{t+1}{t^2+2t+3}\,dt$
16. $\displaystyle\int \frac{6x^3e^{2x}-5x^2}{x^3}\,dx$
17. $\displaystyle\int \frac{6xe^{3x}-18+5x^4}{3x}\,dx$
18. $\displaystyle\int \frac{8x^2e^{-x}+24x+20}{4x^2}\,dx$
19. $\displaystyle\int \frac{4x^{1/2}e^{2x}+3x^3-6}{\sqrt{x}}\,dx$
20. $\displaystyle\int \frac{x^{2/3}+3x^2e^{3x}-5}{x^2}\,dx$
21. $\displaystyle\int \frac{3\sqrt{x}-4x^2e^{3x}}{3x^2}\,dx$
22. $\displaystyle\int \tfrac{1}{3}(2^{3x})-4e^{-2x}+\frac{4}{3x+1}\,dx$
23. $\displaystyle\int \left(3^{-x}+12e^{4x}+\frac{5}{e^{3x}}-e^3\right)\,dx$
24. $\displaystyle\int \left(5^{-3x}+\frac{6}{3x+5}+\pi^4\right)\,dx$
25. $\displaystyle\int \left(4^{-5x}-\frac{9}{4+3x}+e^{\pi}\right)\,dx$
26. $\displaystyle\int (4x+10)e^{x^2+5x+7}\,dx$
27. $\displaystyle\int (\sin x)e^{\cos x}\,dx$
28. $\displaystyle\int \frac{(2x)\ln(x^2+2)}{x^2+2}\,dx$
29. $\displaystyle\int \left(\frac{1}{x}+e^x\right)(\ln x+e^x)^4\,dx$

Part II: Evaluate the following definite integrals

30. $\displaystyle\int_{\sqrt{22}}^{\sqrt{3}} \frac{x\,dx}{\sqrt[3]{x^2+5}}$
31. $\displaystyle\int_0^4 \frac{e^{\sqrt{t}}}{\sqrt{t}}\,dt$
32. $\displaystyle\int_0^7 \sqrt{9+x}\,dx$
33. $\displaystyle\int_1^2 \frac{x+1}{\sqrt{x^2+2x}}\,dx$
34. $\displaystyle\int_0^1 (x-1)e^{x^2-2x}\,dx$
35. $\displaystyle\int_1^3 \frac{x^2}{1+x^3}\,dx$
36. $\displaystyle\int_0^1 \frac{6x}{(1+x^2)^2}\,dx$
37. $\displaystyle\int_0^2 (x^3-3x)^3(x^2-1)\,dx$
38. $\displaystyle\int_0^1 e^{x^2-2x}(1-x)\,dx$
39. $\displaystyle\int_0^1 \frac{9(2+e^{-3x})^2}{e^{3x}}\,dx$
40. $\displaystyle\int_{-1}^0 \frac{12(x+e^{3x})}{(3x^2+2e^{3x})^2}\,dx$
41. $\displaystyle\int_0^2 18x^2\sqrt{9-x^3}\,dx$
42. $\displaystyle\int_0^2 \frac{6x^2}{9-x^3}\,dx$
43. $\displaystyle\int_0^{\pi/2} 6\cos(x)e^{1-2\sin(x)}\,dx$
44. $\displaystyle\int_{\pi/12}^{\pi/6} \left(9\csc^2(3x)-36x^3\right)\,dx$
45. $\displaystyle\int_0^{\pi/3} (9\sin(3x)-4\sec(x)\tan(x))\,dx$

ANSWERS:

1. $\dfrac{-1}{(\ln(x))^3} + C$
2. $\dfrac{4}{3}\ln(4 + e^{3x}) + C$
3. $4\ln(x^2 + 4) + C$
4. $\dfrac{1}{9}(3x^2 + 6x)^{3/2} + C$
5. $\dfrac{-4}{x^2 + 2} + C$
6. $\dfrac{-1}{(\ln(x) + 4)^3} + C$
7. $\dfrac{1}{2}\ln|x^2 - 6x + 5| + C$
8. $\dfrac{3}{4}(3 + \ln(x))^{4/3} + C$
9. $\dfrac{-(2 - \sin(x))^5}{5} + C$
10. $\dfrac{1}{2}\ln|1 + 2\tan(x)| + C$
11. $\dfrac{2}{3}(x^2 + 8x)^{3/4} + C$
12. $2(x^3 + 1)^{3/2} + C$
13. $(e^{2x} + x^2)^{1/2} + C$
14. $\dfrac{1}{18}(2 + 3\ln(x))^6 + C$
15. $\dfrac{1}{2}\ln(t^2 + 2t + 3) + C$
16. $3e^{2x} - 5\ln|x| + C$
17. $\dfrac{2}{3}e^{3x} - 6\ln|x| + \dfrac{5}{12}x^4 + C$
18. $-2e^{-x} + 6\ln|x| - \dfrac{5}{x} + C$
19. $2e^{2x} + \dfrac{6}{7}x^{7/2} - 12\sqrt{x} + C$
20. $\dfrac{-3}{x^{1/3}} + e^{3x} + \dfrac{5}{x} + C$
21. $-\dfrac{2}{\sqrt{x}} - \dfrac{4}{9}e^{3x} + C$
22. $\dfrac{2^{3x}}{9\ln(2)} + 2e^{-2x} + \dfrac{4}{3}\ln|3x + 1| + C$
23. $-\dfrac{3^{-x}}{\ln(3)} + 3e^{4x} - \dfrac{5}{3}e^{-3x} - e^3 x + C$
24. $-\dfrac{5^{-3x}}{3\ln(5)} + 2\ln|3x + 5| + \pi^4 x + C$
25. $-\dfrac{4^{-5x}}{5\ln(4)} - 3\ln|4 + 3x| + e^\pi x + C$
26. $2e^{x^2+5x+7} + c$
27. $-e^{\cos x} + c$
28. $\frac{1}{2}[\ln(x^2 + 2)]^2 + c$
29. $\frac{1}{5}(\ln(x) + e^x)^5 + c$
30. $\dfrac{-15}{4}$
31. $2e^2 - 2$
32. $\dfrac{74}{3}$
33. $2\sqrt{2} - \sqrt{3}$
34. $\dfrac{1}{2}(e^{-1} - 1)$
35. $\dfrac{1}{3}\ln(14)$
36. $\dfrac{3}{2}$
37. $\dfrac{4}{3}$
38. $\dfrac{1}{2}(1 - e^{-1})$
39. $27 - (2 + e^{-3})^3$
40. $-1 + \dfrac{2}{3 + 2e^{-3}}$
41. 104
42. $4\ln(3)$
43. $3(e - e^{-1})$
44. $3 - \dfrac{5\pi^4}{768}$
45. 2