

Problem Sheet 5

Differentiate the following expressions (with respect to x):

1. $(8x + 7)e^x$
2. $\ln(6x^2 + 2x + 5)$
3. $\sin(-5x^2 - 8x + 2)$
4. $(-7x^2 - 5x)\cos x$
5. e^{x^2-8x+7}
6. $(4x^2 - 3x - 7)\ln x$

Integrate the following expressions (with respect to x):

7. $(x + 9)^3$
8. $\sin x \ln(\cos x)$
9. $2x\sqrt{1 + x^2}$
10. $e^{\cos x} \sin x$
11. $x^2 \sin x$
12. $e^x \cos x$

Answers

Differentiation:

1. $8e^x + (8x + 7)e^x$
2. $\frac{12x + 2}{6x^2 + 2x + 5}$
3. $(-10x - 8)\cos(5x^2 + 8x - 2)$
4. $(-14x - 5)\cos x + (7x^2 + 5x)\sin x$
5. $(2x - 8)e^{x^2 - 8x + 7}$
6. $(8x + 3)\ln x + \frac{4x^2 + 3x + 7}{x}$

Integration:

7. $\frac{1}{4}(x + 9)^4$
8. $-\cos x \ln(\cos x) + \cos x + c$
9. $\frac{2}{3}(1 + x^2)^{3/2} + c$
10. $-e^{\cos x} + c$
11. $-x^2 \cos x + 2x \sin x + 2 \cos x + c$
12. $\frac{1}{2}e^x(\cos x + \sin x) + c$