5.1 Further Integration

Question Paper

Course	Edexcel IAL Maths: Pure 3
Section	5. Integration
Topic	5.1 Further Integration
Difficulty	Easy

Time allowed: **50**

Score: **/45**

Percentage: **/100**

Question 1

(i) Find the integral

$$\int \frac{1}{x} \, \mathrm{d}x.$$

(ii) Use calculus to evaluate

$$\int_0^1 e^x \, \mathrm{d}x.$$

(iii) Find an expression for y given that

$$y = \int 3\cos\theta \, \mathrm{d}\theta.$$

[6 marks]

Question 2

(i) Integrate

$$\int 8(2x-1)^3 \ \mathrm{d}x.$$

(ii) Use calculus to find the exact value of

$$\int_0^{\frac{\pi}{4}} \sin 2x \ \mathrm{d}x\,.$$

(iii) Find an expression for y given that

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 3e^{3x}.$$

[8 marks]

Question 3

(a) Given the identity $\cos 2A \equiv 1 - 2\sin^2 A$, show that

$$\sin^2 A = \frac{1}{2}(1 - \cos 2A)\,.$$

[2 marks]

Question 3

(b) Hence find the exact value of

$$\int_{\frac{\pi}{2}}^{\pi} \sin^2 x \ \ \mathrm{d}x.$$

[3 marks]

Question 4

(i) Given that $\mathrm{f}(x) = 2x^2 + 5$, find $\mathrm{f}'(x)$.

(ii) Hence, or otherwise, find

$$\int \frac{4x}{2x^2 + 5} \ \mathrm{d}x.$$

[4 marks]

Question 5

Find the exact value of

$$\int_1^2 e^{3x+2}\ \mathrm{d}x.$$

[5 marks]

Question 6

(i) Integrate

$$\int \sin(2x+1)\ \mathrm{d}x.$$

(ii) Use calculus to find the exact value of

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \sec^2\left(2\theta - \frac{\pi}{6}\right)\ \mathrm{d}\theta.$$

(iii) Find an expression for y given that

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 4\cos(5x+2).$$

[8 marks]

Question 7

(i) Find an expression for y given that

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 7e^{3x-4}.$$

(ii) Integrate

$$\int \frac{1}{4x+9}\ \mathrm{d}x.$$

[4 marks]

Question 8

(i) Integrate

$$\int \frac{1}{2-3x}\ \mathrm{d}x.$$

(ii) Find an expression for y given that

$$y = \int \left(\frac{2}{2x+1} - \frac{1}{3-x}\right)\ \mathrm{d}x$$

giving your answer as a single logarithm.

[5 marks]