

6.1 Integration

Question Paper

Course	CIEAS Maths
Section	6. Integration
Topic	6.1 Integration
Difficulty	Hard

Time allowed: 40
Score: /33
Percentage: /100

Question 1

Use calculus to find the value of

$$\int_4^9 \frac{x^2 + 1}{\sqrt{x}} dx$$

[5 marks]

Question 2

Find the equation of the curve passing through the point (-2, 3) and given by

$$y = \int \left(3 - 2x + \frac{4}{x^2} \right) dx$$

[4 marks]

Question 3a

(a) Using the binomial expansion, or otherwise, show that

$$(2 - x)^3 = 8 - 12x + 6x^2 - x^3$$

[3 marks]

Question 3b

(b) Hence, or otherwise, work out

$$\int (2 - x)^3 \, dx$$

[3 marks]

Question 4

Given

$$\int_1^p \left(1 + \frac{1}{x^2}\right) dx = \frac{15}{4}$$

find the value of the constant p , where $p > 0$.

[5 marks]

Question 5

A function, $f(x)$, has second derivative given by

$$f''(x) = 6(x - 2).$$

Given that $f(3) = 20$, and $f'(2) = 8$, find $f(x)$.

[5 marks]

Question 6a

Use calculus to find the exact value of each of the following improper integrals:

(a)

$$\int_7^{\infty} \frac{5}{x^2} dx$$

[4 marks]

Question 6b

(b)

$$\int_0^{18} \frac{2}{\sqrt{x}} dx$$

[4 marks]

