Standard Functions
Difficulty: Medium

Question Paper 1

Level	A Level only
Subject	Maths - Pure
Exam Board	Edexcel
Topic	Integration
Sub-Topic	Standard Functions
Difficulty	Medium
Booklet	Question Paper 1

Time allowed: **56 minutes**

Score: **/47**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>76%	61%	52%	42%	33%	23%	<23%

Question 1

(a) Find $\int \tan^2 x \, dx$.

(2)

(Total 2 marks)

Question 2

$$f(x) = \frac{6}{x} + \frac{3}{x^2} - 7x^{\frac{5}{2}}$$

(a) Find $\int f(x) dx$.

(3 marks)

(b) Evaluate $\int_4^9 f(x) dx$, giving your answer in the form $m + n \ln p$, where m, n and p are rational numbers.

(3 marks)

(Total 6 marks)

Question 3

Showing all steps, find $\int \cot 3x \, dx$.

(3 marks)

(Total 3 marks)

Question 4

(i) Find $\int \ln(\frac{x}{2}) \, dx$.

(4)

(ii) Find the exact value of $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \sin^2 x \, dx$.

(5)

(Total 9 marks)

(a) Show that $\tan^4 x \equiv \sec^2 x \tan^2 x + 1 - \sec^2 x$.

(4 marks)

(b) Hence find the exact value of $\int_0^{\frac{\pi}{4}} \tan^4 x \, dx$.

(5 marks)

(Total 9 marks)

(a) Show that $\cos 7x + \cos 3x = 2\cos 5x \cos 2x$ by expanding $\cos(5x + 2x)$ and $\cos(5x - 2x)$ using the compound-angle formulae.

(3 marks)

(b) Hence find $\int(\cos 5x \cos 2x)\,dx$.

(3 marks)

(Total 6 marks)

Question 7

Find $\int \cos^2 6x\,dx$.

(5 marks)

(Total 5 marks)

Given that $k \in \mathbb{Z}^+$

(a) show that $\int_{k}^{3k} \frac{2}{(3x-k)}\,dx$ is independent of k,

(4)

(b) show that $\int_{k}^{2k} \frac{2}{(2x-k)^2}\,dx$ is inversely proportional to k.

(3)

(Total 7 marks)