



The Sharp EL-531 calculator may be used on this test.
Show all of your work in the space provided.
The number of marks for each question is indicated in brackets.

Mark:

25

1. Find the following indefinite integrals.

(a) $\int \left(8x^2 - 7x + 2 - e^x + \frac{3}{x} \right) dx$

[2]

(b) $\int 12 \sin 5\theta \cos^3 5\theta d\theta$

[3]

(c) $\int 7x \sqrt{6-x} dx$

[3]

2. Let $f(x) = 4x^3 + 3x + 5$ and note that $f(1) = 12$. Find $(f^{-1})(12)$ and $(f^{-1})'(12)$.

[2]

3. Sketch the region of the xy -plane whose area is represented by the integral $\int_{-5}^5 \sqrt{25 - x^2} dx$ and then evaluate the integral by using a geometry formula.

[2]

4. Let $f(x) = \int_1^{x^2} \sin \sqrt{t} dt$ and find $f'(\pi/2)$.

[2]

5. Evaluate $\int_{-4}^2 (x+4)^2 dx$ by using the limit of a Riemann sum definition of a definite integral.

[3]

6. Use logarithmic differentiation to differentiate $y = (\sin x)^{e^x}$

[3]

7.

- (a) Use Simpson's Rule with $n = 4$ to approximate the integral $\int_1^3 \ln x \, dx$ and round your approximation to four decimal places.

[2]

- (b) Using the fact that $\frac{d}{dx}[x \ln x - x] = \ln x$, find the exact value of $\int_1^3 \ln x \, dx$ and then round this exact answer to four decimal places.

[2]

- (c) Find the average value of $f(x) = \ln x$ on the interval $[1, 3]$. Round your answer to four decimal places.

[1]