



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) $\int (x^4 + 4x - 4 + 4^x) dx$

[2]

(b) $\int \frac{\sin \theta}{\sqrt{\cos \theta}} d\theta$

[2]

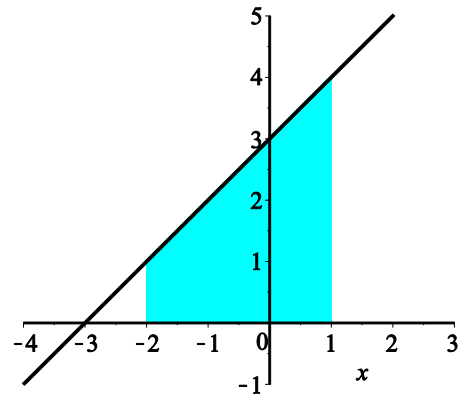
(c) $\int \frac{27x^2}{(3x + 2)^2} dx$

[4]

2. Use logarithmic differentiation to find the derivative of $y = (\ln x)^{\ln x}$.

[3]

3. Write a definite integral that represents the area of the trapezoidal region shaded below. You do not need to evaluate the integral.



[2]

4. The velocity of an object is given by $v(t) = 4t + 2$. Find its position $s(t)$ if $s(1) = 3$.

[2]

5. Let $f(x) = \int_{-1}^x t \cos t \, dt$. Evaluate

(a) $f'(1)$

[1]

(b) $f(1)$ [Hint: Use symmetry.]

[1]

6. Evaluate $\int_6^9 (x-6)^3 \, dx$ by using the limit of a Riemann sum definition of a definite integral.

[3]

7.

- (a) Use Simpson's Rule with $n = 4$ to approximate the definite integral $\int_0^2 \sin^2 x \, dx$ and round your approximation to four decimal places.

[2]

- (b) Using the fact that $\frac{d}{dx} \left[\frac{1}{2} (x - \sin x \cos x) \right] = \sin^2 x$, find and simplify the exact value of $\int_0^2 \sin^2 x \, dx$.

[2]

- (c) Find the average value of $f(x) = \sin^2 x$ on the interval $[0, 2]$. Round your answer to four decimal places.

[1]