



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.
Give exact answers (no decimals) unless told otherwise.

Mark:

25

1. Use partial fractions to integrate $\int \frac{3x+4}{x^2+2x} dx$.

[3]

2. Find $\int \tan^3 x \sec^5 x dx$.

[3]

3. Evaluate $\lim_{x \rightarrow \infty} x^{\frac{1}{\ln x}}$.

[3]

4. Integrate by parts by letting $u = \sin x - x \cos x$ and simplify your answer.

$$\int \frac{\sin x - x \cos x}{x^2} dx$$

[3]

5. Use a trigonometric substitution to integrate $\int \frac{1}{x(x^2 - 9)^{3/2}} dx$.

[5]

6. Evaluate the improper integral, or if it does not exist, then determine whether it is infinity, negative infinity, or neither. Be sure to convert the integral to a one-sided limit.

$$\int_0^2 \frac{1}{\sqrt{4-x^2}} dx$$

[3]

7. Sketch and shade the region in the plane bounded by the curves

$$y = \frac{1}{x}, y = 0, x = 1, \text{ and } x = e,$$

and then compute the centroid (\bar{x}, \bar{y}) of the region and plot the point on your graph.

[5]