



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 integrals.

(a)  $\int \csc^2 6x \cot 6x \, dx$

[2]

(b)  $\int_4^6 \frac{x^2 + 2}{x - 3} \, dx$

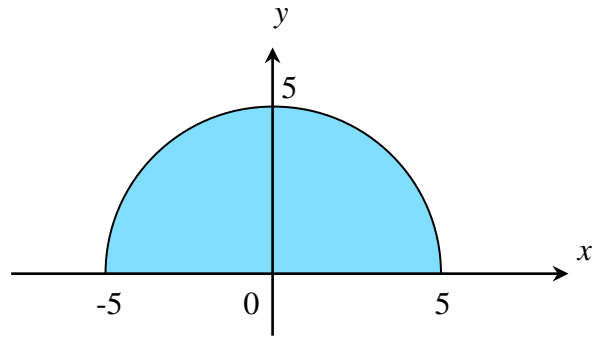
[3]

(c)  $\int x^7 \sqrt{x^4 + 1} \, dx$

[4]

2. Set up a definite integral representing the area of the semi-circular region shown. What is the value of the integral?

[2]



3. Find the average value of  $f(x) = \frac{e^{1/x}}{x^2}$  over the interval  $[1/2, 1]$ .

[3]

4. Evaluate  $\int_{-2}^6 (x+2)^3 dx$  by using the limit of a Riemann sum definition of a definite integral.

[3]

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

[3]

6. Find the particular solution,  $f(x)$ , of the differential equation with the given initial condition.

$$f'(x) = 3^x, f(0) = 1$$

[3]

7. Define  $F(x) = \int_{-\pi/6}^x \sin^3 \theta d\theta$ . Evaluate  $F'(\pi/6)$  by using the Second Fundamental Theorem of Calculus.

[2]