

$$\left(\frac{1+x}{x} \right)^x$$

Section B

5. a) Find the critical points and local extreme values of the function $|x^2 - 16|$

(6 Marks)

- b) Find and determine the types of the critical points of the function $\sin x + \cos x$

(6 Marks)

6. a) Use L'Hôpital's Rule to evaluate

$$\lim_{x \rightarrow 0} \left(\frac{1}{\sin^2 x} - \frac{1}{x^2} \right)$$

(5 Marks)

- b) Use L'Hôpital's Rule to evaluate

$$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x} \right)^x$$

(5 Marks)

7.

- a) Evaluate the following integral $\int \frac{x}{2x+1} dx$

(5 Marks)

- b) Evaluate the following integral $\int \frac{dx}{(1-x)(2-x)}$

(5 Marks)

- c) Show that for $m \geq 2$

$$\int_0^{\pi/2} \sin^m x dx = \left(\frac{m-1}{m} \right) \int_0^{\pi/2} \sin^{m-2} x dx$$

(8 Marks)

8. a) Determine $\int \sin^2 x \cos x dx$

(5 Marks)

- b) Determine $\int x \sin x dx$

(5 Marks)

9. a) For the function $\frac{5x+3}{(x^2+1)(x+4)}$ obtain the partial fractions

(5 Marks)

- b) Using the partial fractions obtained in part a), determine

$$\int \frac{5x+3}{(x^2+1)(x+4)} dx$$

(5 Marks)

$$1 + 1 + \frac{x(x-1)}{2! x^2} + \frac{x(x-1)(x-2)}{3! x^3}$$

$$(1+n)^{1/n} \quad \left(1 + \frac{1}{x} \right)^x - e$$