PART 1 (Questions 1 to 10) (75 marks)

## Question 1 (5 marks)

(a) Show that $\frac{4}{x^{2}-4}=\frac{1}{x-2}-\frac{1}{x+2}$.

(b) (i) Hence show that $\int \frac{1}{x^{2}-4} \mathrm{~d} x=\frac{1}{4} \ln \left|\frac{x-2}{x+2}\right|+c$.

(ii) Find the exact value of $\int_{0}^{1} \frac{1}{x^{2}-4} \mathrm{~d}$.


