Question 1 **(8 marks)**

(a) Consider the function $f(x) = x^3 e^{2x}$.

(i) Differentiate $f(x)$. (2 marks)

(ii) Determine the value of x for any stationary points of $f(x)$. (3 marks)

(b) Evaluate $\int_0^{\frac{\pi}{4}} \sin(2x + \pi) dx$. (3 marks)