Remember:

(1) Explain your answers and show all working. Points will be deducted for lack of explanation or lack of working.

(2) Give exact answers, not decimal approximations.

1. Suppose \( f(x) \) is defined, for all real \( x \), by

\[
f(x) = \int_{-2}^{\sin x} (24s^2 - 6) \, ds.
\]

Find the maximum and minimum values of \( f(x) \), and the values of \( x \) where they occur, for \( x \) in the interval \([0, \frac{3\pi}{4}]\).

2. At 3:47 p.m. water starts pouring into an empty tank at a rate of

\[
900 \left( \frac{1}{t + 3} \sec \left( \frac{\pi}{t + 3} \right) \right)^2
\]

l/min (litres per minute), where \( t \) is the time in minutes after 3:47 p.m. Just before 3:48 p.m. it is realised that the outlet valve has been left open, so the tank is still empty, and the valve is closed at 3:48 precisely. How much water is in the tank at 3:50 p.m.?