Problem 1

Given the \( ODC_{out} = [x_1, x_2', x_2, x_3]^T \) and the \( CDC_{in} = x_1' + x_2 x_3 \) for a 3-input 4-output Boolean function:

(a) Compute the \( DC_{ext} \) (give a minimized Boolean expression).

(b) Comment on the meaning of the \( DC_{ext} \) result for each output.

Problem 2

Consider the logic network defined as:
\[
\begin{align*}
  d &= y' \\
  f &= (x + d)' \\
  e &= (zx)' \\
  k &= f \odot e \\
  m &= d \oplus e
\end{align*}
\]

Inputs are \( \{ x, y, z \} \) and outputs are \( \{ k, m \} \). Assume \( CDC_{in} = xyz' \). Compute \( CDC_{out} \). Note that \( \odot \) is the XNOR operator and \( \oplus \) is the XOR operator.

Problem 3

Consider the logic network above of Problem 2. Compute the ODC sets for all internal and input vertices assuming that the outputs are fully observable.