The following sub-sections relate to MOSFET device operation:

a) Draw the cross-section of an NMOS transistor in an n-well process (p' substrate) in strong inversion. Label the depletion regions and the channel. Comment on the terminal voltages associated with the conditions shown in your drawing.

b) A 1V sine wave at 10kHz, \( v_x = 0.5 \sin(\omega t) \), is applied to an NMOS transistor under each of the conditions shown below. You can assume that the threshold voltage and p-n diode voltages are all 0.5V. For each of the cases below:

   a. Sketch an approximate (qualitative) waveform of the current, \( i_x \), in the driving waveform, \( v_x \).
   b. Explain which terminals (gate, drain, source, bulk) the current (if any) will flow through.

![MOSFET Diagrams](image-url)