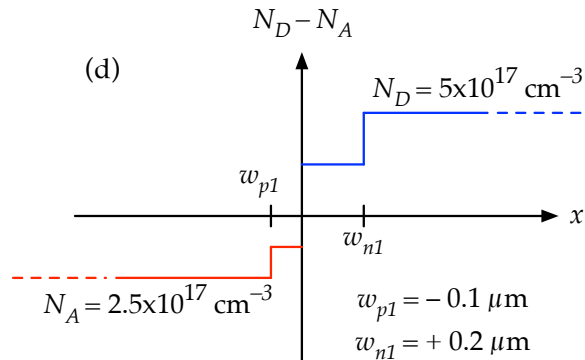
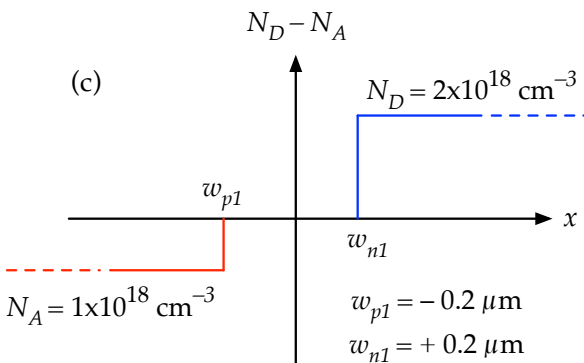
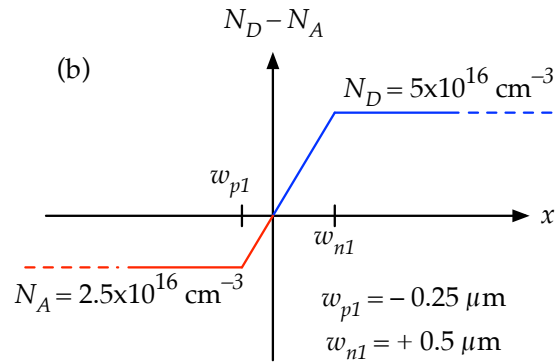
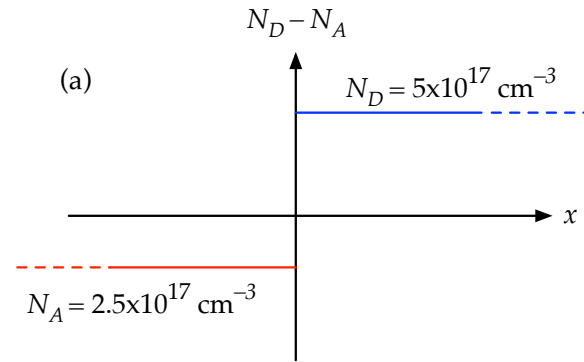


**Homework J2**

The doping profiles of four different silicon  $p-n$  junctions are shown below. Calculate the built-in potential in each case. For cases (b) – (d), assume that the depletion layers edges beyond  $w_{p1}$  and  $w_{n1}$ . In case (d), the doping levels near the junction is half of the values farther away from the junctions. Hint: Start by sketching the energy band diagram in each case. Use the usual silicon parameters at room temperature.



(a)  $\phi_{bi} =$  \_\_\_\_\_

(b)  $\phi_{bi} =$  \_\_\_\_\_

(c)  $\phi_{bi} =$  \_\_\_\_\_

(d)  $\phi_{bi} =$  \_\_\_\_\_