Answers to Practice Exam 1 - BIO 131

Multiple choice:

1) C
2) D
3) D
4) B
5) A
6) E
7) C
8) C
9) A
10) B
11) D
12) E
13) C
14) A
15) B
16) D
17) E
18) D
19) A
20) C
21) A
22) B
23) B
24) A
25) C
26) E
27) E

Short answer

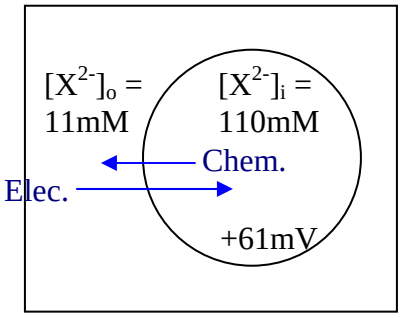
28) (5 pts) While forging in the woods, Rick eats a colorful bug (Ooooo, not smart). The bug has a chemical in it that quickly spreads throughout Rick's body and prevents any of his mechanoreceptors from firing. What would you expect to happen to Rick?

He would lose the sensations of touch, hearing, proprioception, and some pain.

29) (4 pts) Why would it be impossible to read Braille using your back instead of your fingertips?

The receptive fields on your back are too large to be able to distinguish between several bumps. Many bumps would only feel like a single bump.

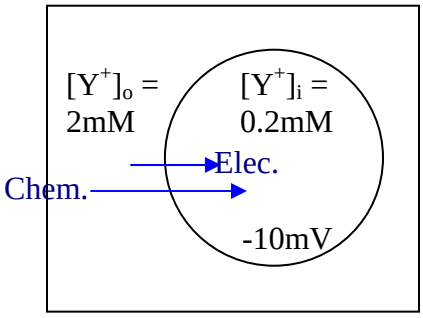
30) (6 pts) For the cell in the figure to the right, draw both the chemical and electrical forces acting on the ion X^{2-}. If a channel for the ion is opened, in which direction with X^{2-} flow? (into the cell, out of the cell) (show your work).



$E_x^{2-} = 61mV/-2 * \log(11/110) = +30.5mV$

At =61mV the elec. force is larger than the chem. force.
X^{2-} will move into the cell.

29) (4 pts) For the cell in the figure to the right, draw both the chemical and electrical forces acting on the ion Y^+. If Y^+ is permeable, what would be the charge inside the cell when Y^+ stopped moving across the membrane?



$E_Y^+ = 61mV/ 1 * \log (2/ 0.2) =$ 61 mV

Extra credit (4 pts) If Cl^- equilibrium potential is -20mV, is there more of it inside or outside of the cell?

If the potential is –20mV at equilibrium, then the elec. force is out (since the negative ICF will repel the negative Cl- ion). Since the concentration force must be opposite the elec. at equilibrium then it must be into the cell, meaning there is more Cl- outside the cell.