

HW 8 solutions

$$(a) E_{Ca} = \frac{kT}{2q} \log \left(\frac{[Ca^{2+}]_o}{[Ca^{2+}]_i} \right) = \frac{kT}{2q} \log \left(\frac{[Ca^{2+}]_o}{[Ca^{2+}]_i} \right)$$

$$(b) C \frac{dv}{dt} = -g_{Ca} (v - E_{Ca})$$

$$(c) g_{Ca} = \bar{g}_{Ca} P(a \text{ and } b \text{ are open}) \\ = \bar{g}_{Ca} P(a \text{ is open}) \\ \boxed{g_{Ca} = \bar{g}_{Ca} a}$$

$$(d) \frac{da}{dt} = \underbrace{\alpha_a(v)}_{\text{closed open}} (1-a) - \underbrace{\beta_a(v)}_{\text{open gate close}} a$$

$$(e) \beta_a'(v) > 0$$

$$\alpha_a'(v) > 0$$