3. Consider the unbalanced reaction

$$\text{NH}_3(g) \rightleftharpoons \text{N}_2(g) + \text{H}_2(g)$$

When the reaction is balanced with the smallest whole-number coefficients, $K = 9.0$.

(a) Balance the chemical reaction with the smallest whole-number coefficients.
(b) A reaction mixture is prepared with $[\text{NH}_3]_i = 1.0 \text{ M}$, $[\text{N}_2]_i = 2.0 \text{ M}$, and $[\text{H}_2]_i = 2.0 \text{ M}$. Predict if the reaction will move left or right to reach equilibrium, and derive the equation one would solve to calculate the equilibrium concentration of all three species.