37. We use Eq. 8-20 and various observations made in §8-5.

   (a) The force at the equilibrium position $r = r_{\text{eq}}$ is

$$F = -\frac{dU}{dr}\bigg|_{r=r_{\text{eq}}} = 0$$

$$-\frac{12A}{r_{\text{eq}}^{13}} + \frac{6B}{r_{\text{eq}}^{7}} = 0$$

   which leads to the result

$$r_{\text{eq}} = \left(\frac{2A}{B}\right)^{\frac{1}{6}} = 1.12\left(\frac{A}{B}\right)^{\frac{1}{6}}.$$

   (b) This defines a minimum in the potential energy curve (as can be verified either by a graph or by taking another derivative and verifying that it is concave upward at this point), which means that for values of r slightly smaller than r_{eq} the slope of the curve is negative (so the force is positive, repulsive).

   (c) And for values of r slightly larger than r_{eq} the slope of the curve must be positive (so the force is negative, attractive).