Solution to Problem Set #4: Question 3 (if it was a Cournot market)

$Q_a = 21 - 2P_a + P_b$, therefore $P_a = \frac{21+P_b-Q_a}{2}$

$Q_b = 21 + P_a - 2P_b$, *therefore* $P_b = \frac{21+P_a-Q_b}{2}$

Plugging P_b *into* P_a

$$P_a = \frac{21 + \left(\frac{21 + P_a - Q_b}{2}\right) - Q_a}{2}$$

$$P_a = \frac{63 - Q_b - 2Q_a}{3}$$

$$\pi_a = \left(\frac{63 - Q_b - 2Q_a}{3}\right) Q_a$$

$$\frac{\partial \pi}{\partial A_a} = \frac{63 - Q_b - 4Q_a}{3} = 0$$

Since the market is symmetric, we know that $Q_a = Q_b$

Therefore, $\frac{63-Q_a-4Q_a}{3} = 0$

$$Q_a = 12.6$$