Economics 326: Suggested Solutions to Midterm 2

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1. As π increases so q_1 increases, while $q_2 = q_2^*$ is unaffected. As $\pi \to 1$ so $q_1 \to q_2^*$, the welfare maximising choice. If π is close enough to 0 so $q_1 = 0$. Intuitively, if the seller increases q_1, type θ_2 gets higher rents, but the profit from type θ_1 rises because there is less distortion. If there are lots of θ_1 agents such an increase in q_1 is therefore warranted.

2. Spence's signaling with re-normalised utility.
(a) A separating equilibrium exists: $e_L = 0$ and $e_H = \theta_L(\theta_H - \theta_L)$.
(b) A separating equilibrium does not exist. If the high type is willing to undertake any education level, the high type will copy them.

3. There is no such equilibrium. If θ_1 chooses e_1 and θ_2 chooses e_2, then θ_3 must choose e_2. The formal proof is as follows. Types θ_1 and θ_3 choose e_1 and get paid w_1. Type θ_2 chooses e_2 and gets paid w_2. The (IC) constraint for θ_1 says

$$w_1 - \frac{e_1}{\theta_1} \geq w_2 - \frac{e_2}{\theta_1}$$

The (IC) constraint for θ_2 says

$$w_2 - \frac{e_2}{\theta_2} \geq w_1 - \frac{e_1}{\theta_2}$$

Putting these together,

$$\theta_2(w_2 - w_1) \geq e_2 - e_1 \geq \theta_1(w_2 - w_1)$$

Hence $w_2 \geq w_1$. This means that

$$\theta_3(w_2 - w_1) \geq \theta_2(w_2 - w_1) \geq e_2 - e_1$$

and θ_3 prefers (e_2, w_2) over (e_1, w_1).