

## Question#62561 - Economics – Microeconomics | Completed

### Question

A consumer utility function is  $u=\sqrt{EF}$ . Find the Marshallian demand function for E and F, find the compensated demand function. Now let the budget be  $m=100$ . Prices are 1,1. What are the demand quantities? What is the utility level?

Let the price of F rise to 2. What are the demand quantities? What is the utility level? What is the income compensation necessary to put the consumer back to his original utility level after the price change?

Assume the utility function is  $u= \ln E + \ln F$ . How does this new utility function change your results from the beginning?

### Answer

$$u = \sqrt{E \cdot F}, \quad MU_E = \frac{\sqrt{F}}{2 \cdot \sqrt{E}}, \quad MU_F = \frac{\sqrt{E}}{2 \cdot \sqrt{F}}$$

$$p_E=1, \quad p_F=1, \quad m=100$$

$$\frac{MU_E}{MU_F} = \frac{p_E}{p_F} \Rightarrow \frac{\sqrt{F} \cdot 2 \cdot \sqrt{F}}{\sqrt{E} \cdot 2 \cdot \sqrt{E}} = \frac{p_E}{p_F} \Rightarrow \frac{F}{E} = 1 \Rightarrow E = F$$

$$m = p_E \cdot E + p_F \cdot F \Rightarrow 100 = p_E \cdot E + p_E \cdot E \Rightarrow E^* = 50, \quad F^* = 50$$

$$u(E, F) = \sqrt{50 \cdot 50} = 50$$

$$p_E=1, \quad p_F=2, \quad m=100$$

$$\frac{MU_E}{MU_F} = \frac{p_E}{p_F} \Rightarrow \frac{\sqrt{F} \cdot 2 \cdot \sqrt{F}}{\sqrt{E} \cdot 2 \cdot \sqrt{E}} = \frac{p_E}{p_F} \Rightarrow \frac{F}{E} = \frac{1}{2} \Rightarrow E = 2F$$

$$m = p_E \cdot E + p_F \cdot F \Rightarrow 100 = p_E \cdot 2F + p_F \cdot F \Rightarrow 100 = 2F + 2F \Rightarrow F^* = 25, \quad E^* = 50$$

$$u(E, F) = \sqrt{50 \cdot 25} = 35.4$$

$$\text{income compensation: } \sqrt{E \cdot F} = \sqrt{2F \cdot F} = 50 \Rightarrow 2F^2 = 2500 \Rightarrow F = 35.4, \quad E = 70.8 \Rightarrow$$

$$\Rightarrow 1 \cdot 70.8 + 2 \cdot 35.4 = 141.6 \Rightarrow \text{income compensation (for the previous utility level 50)} = (141.6 - 100) = 41.6$$

$$u = \ln(E) + \ln(F) \text{ – because of concavity max}(u): E = F = 50 \text{ (} p_E = 1, p_F = 1, m = 100)$$

$$u = \ln(50) + \ln(50) = 7.82 \text{ – with such type of function general utility is much lower}$$