

⑦ $D(I) = A \cdot I^{1.23}$ is the demand function

What is the approximate change in demand if the income increases by 1%?

→ The question just asks us to find the elasticity of demand with respect to income. Namely, $\epsilon_{D,I} = \frac{\partial D(I)}{\partial I} \cdot \frac{I}{D(I)}$.

• Step 1: Find $\frac{\partial D(I)}{\partial I}$.

$$D'(I) = A \cdot (1.23) I^{0.23} \quad (\text{As } (x^a)' = a \cdot x^{a-1})$$

• Step 2: Write $\epsilon_{D,I} = \frac{D'(I) \cdot I}{D(I)}$ directly:

$$\epsilon_{D,I} = \frac{A \cdot (1.23) \cdot I^{0.23} \cdot I}{A \cdot I^{1.23}}$$

• Step 3: Using the rule $x^a \cdot x^b = x^{a+b}$, we know that $I^{0.23} \cdot I = I^{0.23+1} = I^{1.23}$. Hence,

$$\epsilon_{D,I} = \frac{A \cdot (1.23) \cdot I^{1.23}}{A \cdot I^{1.23}}$$

• Step 4: Noting that $A \cdot I^{1.23} = D(I)$, we can rewrite the previous expression as:

$$\epsilon_{D,I} = \frac{D(I) \cdot 1.23}{D(I)} = \boxed{1.23 = \epsilon_{D,I}}$$