Intro to Macroeconmics: Assignment I

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Abstract

1 Solutions to the problems

Question 1. Review Question (2).

Solution. The concept of opportunity cost is

Question 3. Utility function.

Solution. (1) We claim that preferences are strictly monotonic with respect to z and s. Taking the partials with respect to z and s, we obtain

$$\begin{aligned} \frac{\partial U}{\partial z} &= \frac{\alpha}{2} z^{-\frac{1}{2}}, \\ \frac{\partial U}{\partial s} &= \frac{1-\alpha}{2} s^{-\frac{1}{2}}. \end{aligned}$$

As $\alpha \in (0,1)$, we see that both partials are strictly positive for all positive values of z and s, which is the domain of interest in this case. Hence, we have shown that the preferences are strictly monotonic with respect to z and s. Note that strict monotonicity implies monotonicity as well.

(2)

(3) Yes, the marginal utility is decreasing. Evaluating the second-order partials from the first-order partials obtained in part (1), we get

$$\begin{aligned} \frac{\partial^2 U}{\partial z^2} &= -\frac{\alpha}{4} z^{-\frac{3}{2}}, \\ \frac{\partial^2 U}{\partial s^2} &= -\frac{1-\alpha}{4} s^{-\frac{3}{2}}. \end{aligned}$$

As $\alpha \in (0,1)$, we see that for any positive values of z and s, we have

$$\begin{aligned} \frac{\partial^2 U}{\partial z^2} &< 0, \\ \frac{\partial^2 U}{\partial s^2} &< 0. \end{aligned}$$

Therefore, we have shown that the marginal utility is decreasing with respect to both variables. It is, in fact, strictly decreasing.

(4)

(5)

(6)

(7)

(8)