Algorithm Design Manual Solutions

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Solutions to Selected Problems
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1 Introduction To Algorithm Design

Finding Counter Examples

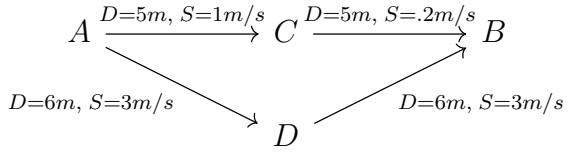
1-1. *Show that a + b can be less than min(a, b)*

$$\text{Let } a = -1, b = -1$$
$$\text{Then } a + b = -2,\ min(a, b) = -1$$
$$\therefore \exists\ a, b \in Z : a + b < min(a, b)$$

1-2. *Show that a * b can be less than min(a, b)*

$$\text{Let } a = -1, b = 5.$$
$$\text{Then } a * b = -5,\ min(a, b) = -1$$
$$\therefore \exists\ a, b \in Z : a * b < min(a, b)$$

1-3. *Design/draw a road network with two points a and b such that the fastest route between a and b is not the shortest route*



Although the distance from A to B through C is shorter than going through D, road constraints limit the time it takes making the route through D faster despite it being longer.