

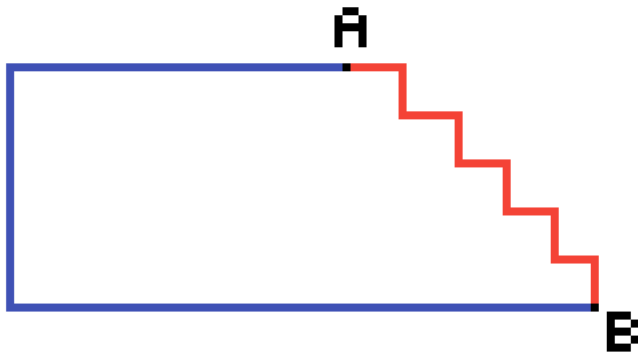
**Exercises 1-6.**

**Ex 1.1** Let  $a = b = -1$ , then  $a + b = -2 < -1 = \min(a, b)$ .

**Ex 1.2** Let  $a = -1$  and  $b = 2$ , then  $a \cdot b = -2 < -1 = \min(a, b)$ .

**Ex 1.3** Suppose there are only two routes between  $a$  and  $b$ , named  $x$  and  $y$ . The route  $x$  is 20 km, but the speed limit is 100 km/hr throughout.  $y$  on the other hand is 18 km, but the speed limit is 1 km/hr throughout. Thus  $y$  is the shorter route, but  $x$  is faster.

**Ex 1.4**



The red route has 9 turns while blue has 2 turns, yet the red route is clearly shorter.

**Ex 1.5 a)**

Consider  $S = \{1, 2\}$  and  $T = 2$ . The first-fit algorithm would pick 1 and ignore 2. A correct solution however would ignore 1 and take 2.

**Ex 1.5 b)**

Consider  $S = \{1, 2\}$  and  $T = 2$ . The best-fit algorithm would pick 1 and ignore 2. A correct solution however would ignore 1 and take 2.

**Ex 1.5 c)**

Consider  $S = \{4, 5, 8\}$  and  $T = 9$ . The largest-first algorithm would pick 8 and ignore the remaining elements. A correct solution however would take only 4 and 5, which sum up to  $T$ .

**Ex 1.6**

Consider  $U = \{1, 2, 3, 4, 5, 6\}$ ,  $S_1 = \{1, 2, 3, 4\}$ ,  $S_2 = \{1, 2, 5\}$ , and  $S_3 = \{3, 4, 6\}$ . The algorithm would first pick  $S_1$ , followed by  $S_2$  and  $S_3$  in arbitrary order. Thus the algorithm would pick three sets. However  $S_2 \cup S_3 = U$ , thus there exists a solution with only two sets.