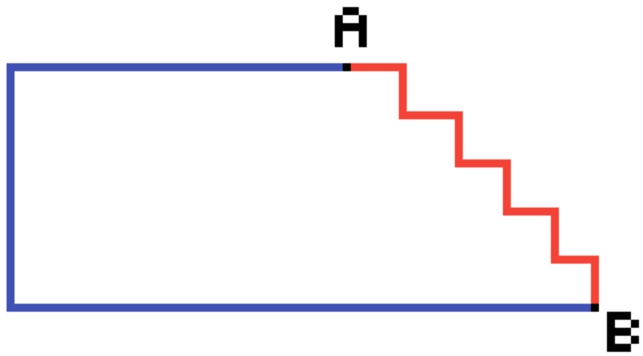
Exercises 1-6.

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



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 $U = \{1, 2, 3, 4, 5, 6\}$ and $S = \{\{1, 2, 3\} \{2, 3, 4\}, \{3, 4, 5\}, \{4, 5, 6\}\}$. For the first pick, the algorithm faces a tie as all subsets are of the same size. Suppose the tie is resolved by picking $\{2, 3, 4\}$, then it would proceed to pick $\{4, 5, 6\}$ and $\{1, 2, 3\}$, in that order. However, the correct approach is to pick the first and last subset, namely $\{1, 2, 3\}$ and $\{4, 5, 6\}$.