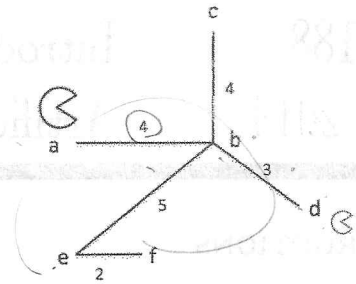


1. (36 points) Rendezvous

Pacman and Pacbaby are trying to reach each other on a 2D map, as shown to the right. At each turn Pacman and Pacbaby must run from one rest spot to another (labeled a, b, \dots). The amount of time required to get to each rest spot from an adjacent rest spot is equal to the distance between the two, $d(i, j)$, shown at right. Whichever Pac arrives first must wait for the other one before the next turn begins. Pacman and Pacbaby are trying to meet at the same rest spot as quickly as possible.



- (a) (6 pt) Give a minimal state space for this problem (i.e. do not include extra information). You should answer for a general instance of the problem, not the specific map shown.

Put your answer to 1a here:

$h = \# \text{ rest spots}$

$2n$

- (b) (18 pt) Let $\text{Adjacent}(i)$ be the set of rest spots adjacent to rest spot i . Define a transition model, goal test and step cost function for this problem.

Put your answer to 1b here:

Transition
 $\text{Result}(\text{Adj}(a), (p_m, p_b)) = b$
 $\text{Result}(\text{Adj}(b), (p_m, p_b)) = a, c, d, e$
 $\text{Result}(\text{Adj}(c), (p_m, p_b)) = b$
 $\text{Result}(\text{Adj}(d), (p_m, p_b)) = b$
 $\text{Result}(\text{Adj}(e), (p_m, p_b)) = b, f$
 $\text{Result}(\text{Adj}(f), (p_m, p_b)) = e$
 Goal Test: $(p_m == p_b)$

Stepcost: $\sum (\text{distance of Pacman}) + \sum (\text{distance of Pacbaby})$