Some suggestions for P2 Multiagent Search

Q1. Reflex agent's evaluation function:

Notes: distance can be calculated using Manhattan distance.

- Set score to 0 for start
- Some possible components that you may want to consider adding a value to score:
    - Distance from Pacman to current food pellets
        - If the distance is 0, then add a positive value to score (the agent ate a food pellet! So add a reasonably large value)
        - Otherwise, add a small positive value to score. For example, reciprocal values of distance: **1/distance**. This encourages Pacman to explore nearby food.
    - Distance from Pacman to ghosts
        - If distance > 1, maybe no value to add.
        - If distance <= 1 and scared timer is large than 0, add a positive value (reasonably large)
        - If distance <= 1 and scared timer <= 0, add a negative value (reasonably large). This encourages Pacman to stay away from ghosts.
    - Distance from Pacman to capsules (for ghost timer)
        - If distance = 0, then add a positive value to score (reasonably large).
        - Otherwise, add a small positive value. For example, reciprocal values of distance: (**1/distance)*a**, where a is a constant > 1. This encourages Pacman to explore nearby food and a is used to weigh more on capsules that regular foods.

Q5. Better evaluation function

Some possible features you may want to consider:

- Current state's score passed to the function.
- Distance to closest food.
- The total number of capsules
- Ghost distance
    - If any ghost is near Pacman (distance <= 1), then set the distance to close food to a very large number (positive infinite or 99999999999999, etc.). This means run for life instead of eat food.
- The scared timer of a ghost.
- Possibly more features you can consider.

Then you will have a linear combination of the features you define with their weight values.

- Current state's core: must be one of the important features. A large positive number to add to score.
- The number of food count: add a negative value to score (possibly large value) or reciprocal values: 1/total
- The number of capsules: add a small negative value or reciprocal values: 1/total
- Distance to closest food: Reciprocal values of distance: **1/distance** * a, a >= 1
- If the scared timer > 0, add a positive bonus value to score.