Specify a set of 5 potential heuristics that can be applied to this game and

discuss the benefits of each of the heuristics.   Note that the heuristics do not need to be admissible

1. **Manhattan distance** – the Manhattan distance is a distance metric used typically when looking for movement in 4 directions. This is beneficial and can be used within the game as a heuristic since players can move their pieces either Vertically or Horizontally – this will allow us to have a metric and calculate the distance between the two pieces if the movement is vertical or horizontal.

2. **Euclidean Distance** – Euclidean distance is particularly helpful when the distance between 2 data points in a plane. This is helpful when needing to track a metric in the game where the game mechanics would have to keep track of knowing where each type of player is at all times, whether it's a Wumpus, mage, or hero. So, by Implementing Euclidean distance in this game, it could be beneficial in the sense it will allow the users to keep track of how far each character is from the other. One would have to keep in mind that Euclidean is for more so straight line, so it would be useful to calculate edge to edge corners, from one side of the board to the other.

3. **Chebyshev Distance** - The Chebyshev distance metric is useful for looking for movement in 8 directions. Since pieces can be moved horizontally, vertically, or diagonally, it is essential to calculate and have a metric way to know the distance between pieces diagonally. Chebyshev can also be applied to this game in order to calculate the distance in all 8 adjacent cells that can be reached by 1 unit – this is certainly important in updating tracking of movement across the board and knowing if a Wumpus is in vicinity of a player or mage.

4. **Nearest Neighbor** – Nearest Neighbor is a simple but effective heuristic that simply finds the closest node to itself and will continue to do so until its path is finished. This can be applied to the game to get a sense of how the game mechanics should be, as well as locate if there are any Wumpus, Mage, Or Hero tiles nearby, allowing for an alternative way to know if there is need for the game state to be updated.

5. **Form of A* with Cost Analysis** – One could use this heuristic, where, when $f(x) = g(x) + h(x)$, where $h(x)$ is the forward cost, and estimate of the distance of the current node from the goal node, and $g(x)$, which is the backward cost, the cumulative cost of a node from the root node. This ais very beneficial in the game as we want to calculate the shortest path between the player and the agent. By actively checking the cost and analyzing that, it prevents from the game repeating itself on and on and furthermore allowing a form of self-checking within the game.