Homework2

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Question 1

1. In dynamic environment or explore situtation, behavior-based is more acceptable. If we already know the whole environment, we can use optimization-based methods to get better performance and better planning if we have multiple tasks.
2. *Robustness*: Behavior-based robots can handle unexpected situations better as they react to real-time sensory inputs. *Simplicity*: Each behavior module is simple and easy to design and implement.
   Modularity: Systems are made up of independent behavior modules that can be added or modified without affecting the entire system.
   Adaptability: Capable of adapting to a variety of environments and tasks due to their decentralized control system.
   Real-Time Performance: Efficient in dynamic environments due to quick response to sensory feedback.
3. It hard for one single approach to handle all the tasks and environments for a long term, there may be many unexpected situations. We can combining behavior-based models for real-time interaction and adaptation, along with more traditional AI for complex problem solving and planning.

Question 2

1.

$$
\begin{aligned}
Uniform: \vec{v} &= \vec{v}_0 \\
Perpendicular: \vec{v} &= \eta \vec{h} \frac{v_p}{h^3} \\
Attractive: \vec{v} &= \xi(\vec{r} - \vec{r}_0)|\vec{r} - \vec{r}_0| * v_0 \\
Repulsive: \vec{v} &= \eta(\vec{r} - \vec{r}_0)\frac{v_0}{|\vec{r} - \vec{r}_0|^3} \\
Tangential: \vec{v} &= \vec{w}_0 \times (\vec{r} - \vec{r}_0)
\end{aligned}
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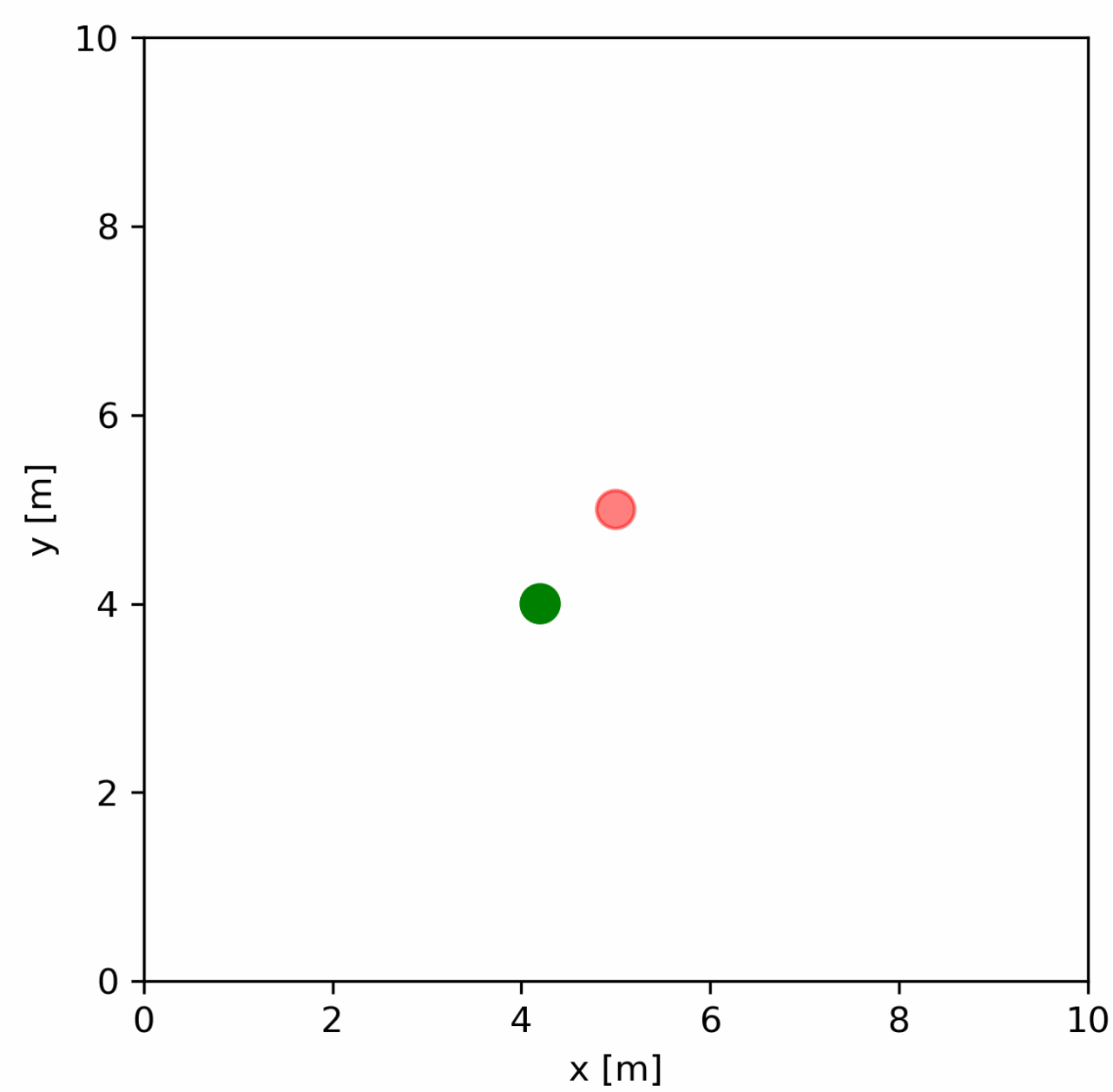
1. Results: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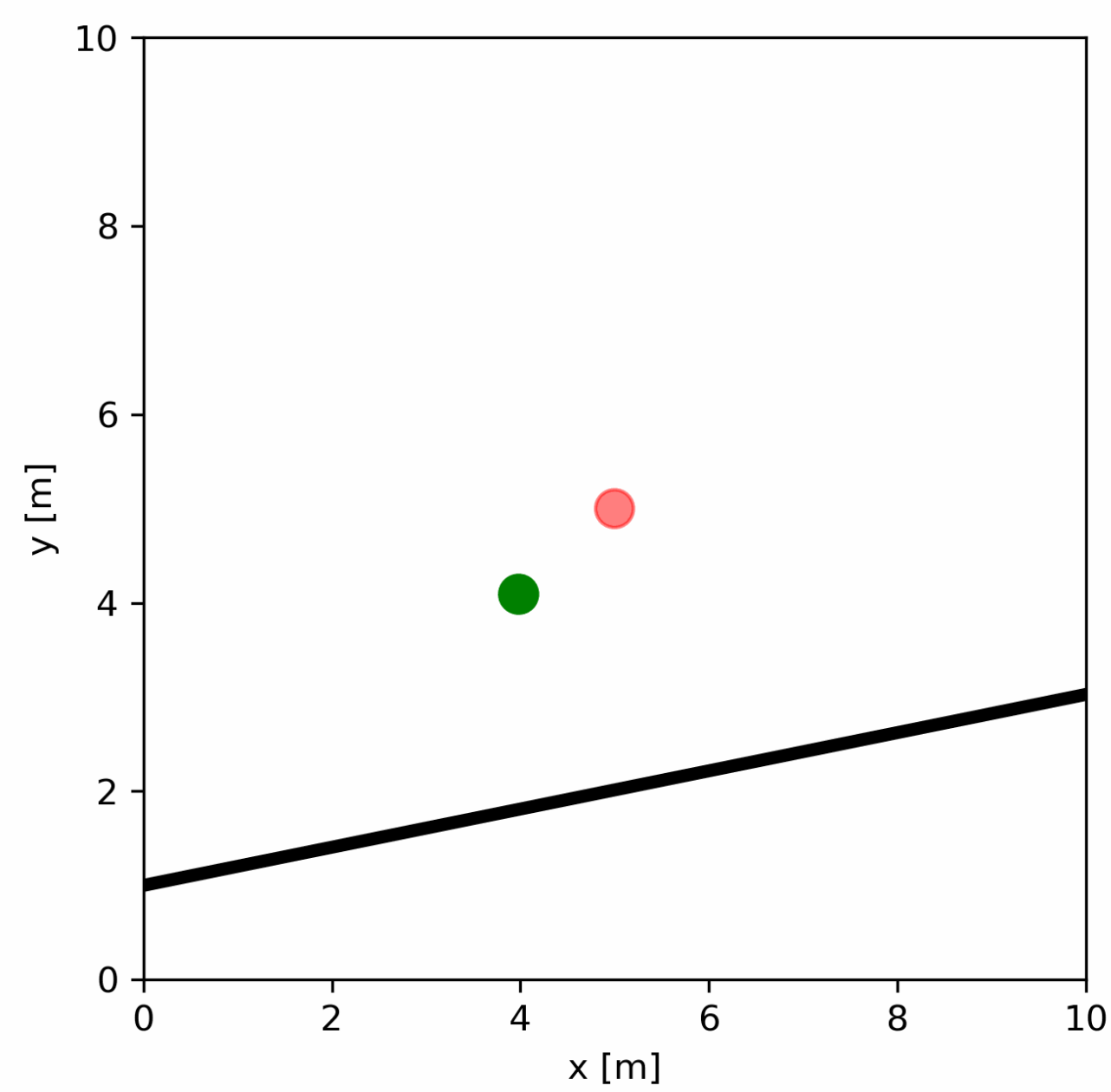
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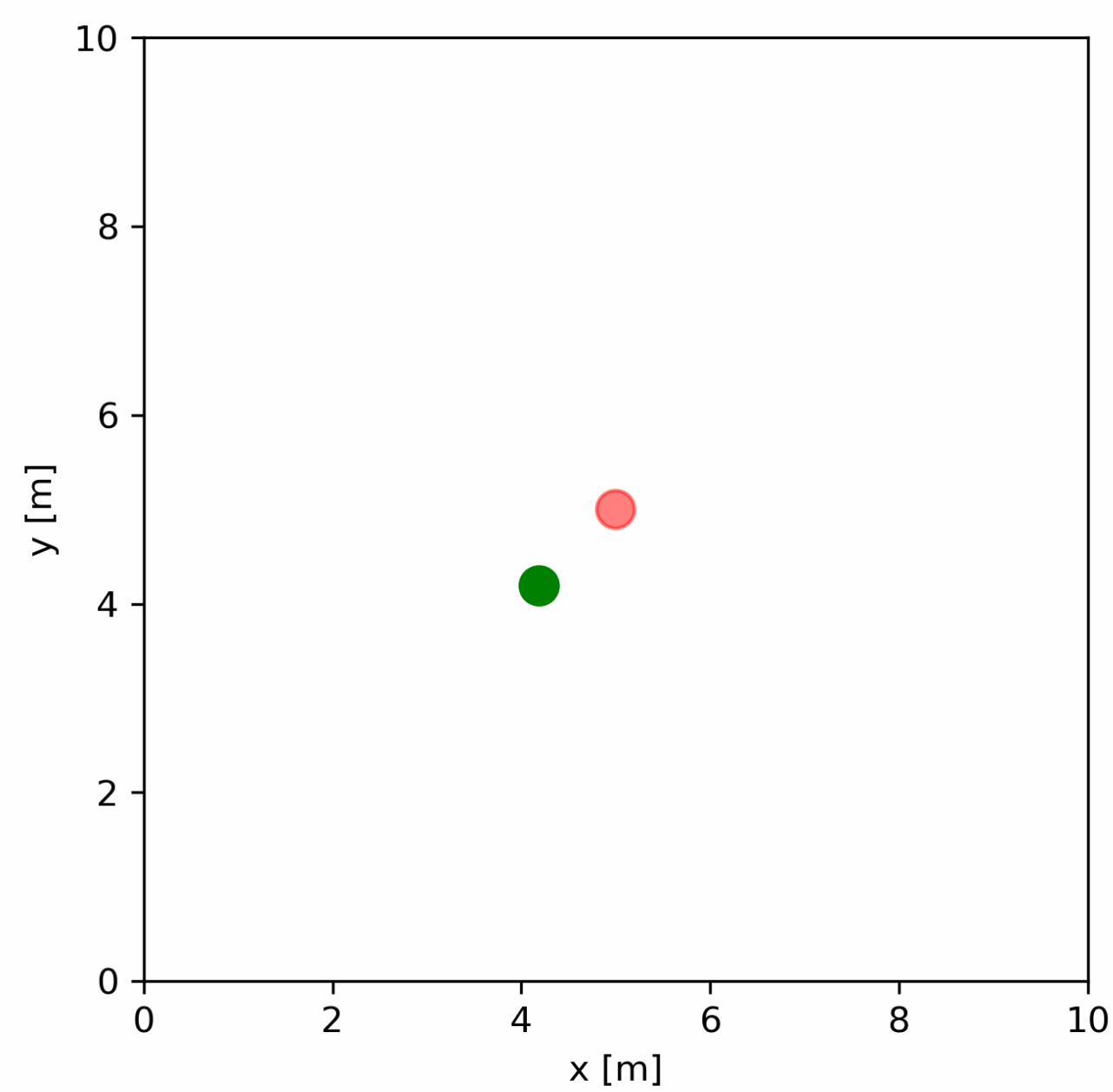
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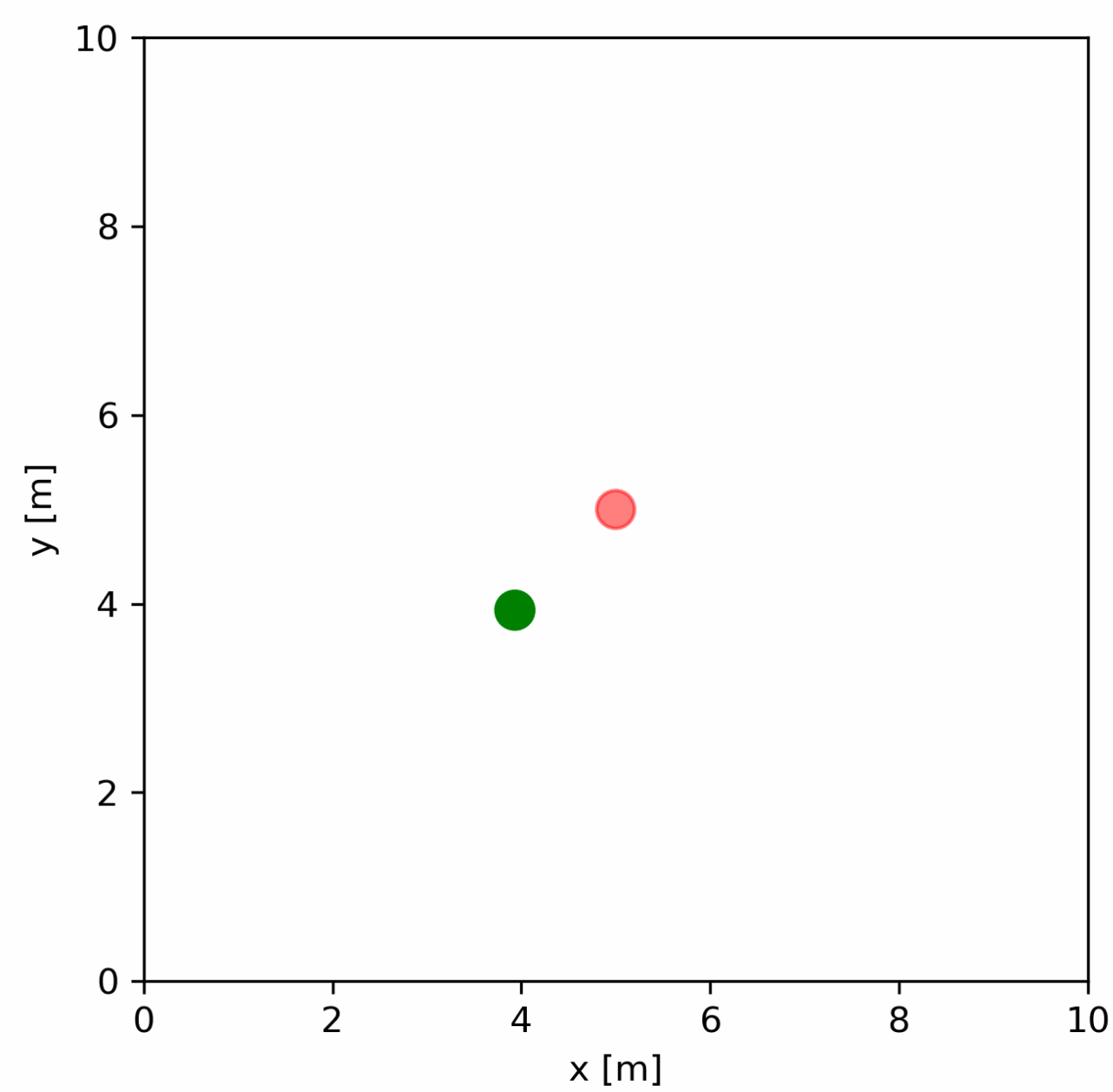
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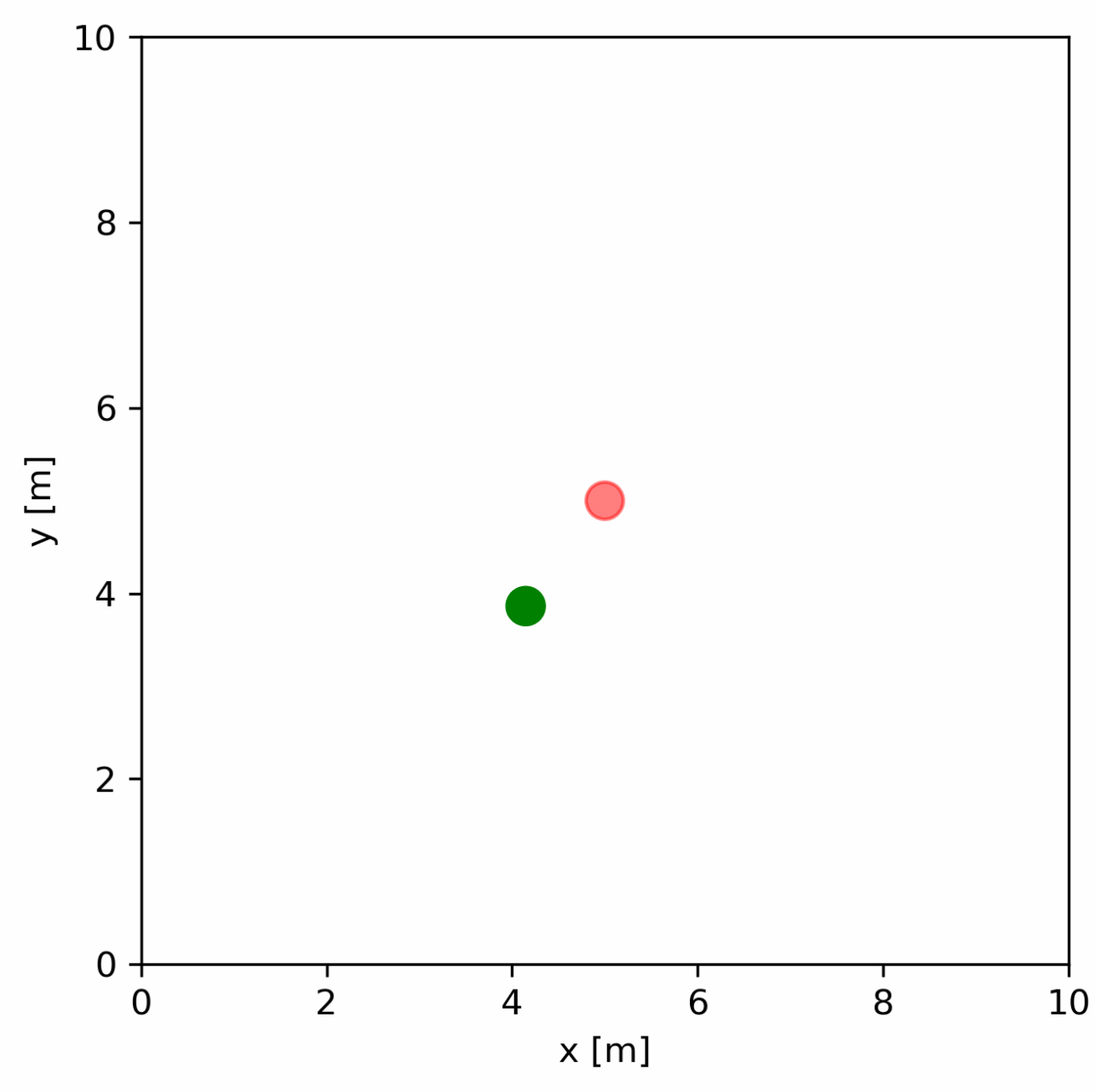
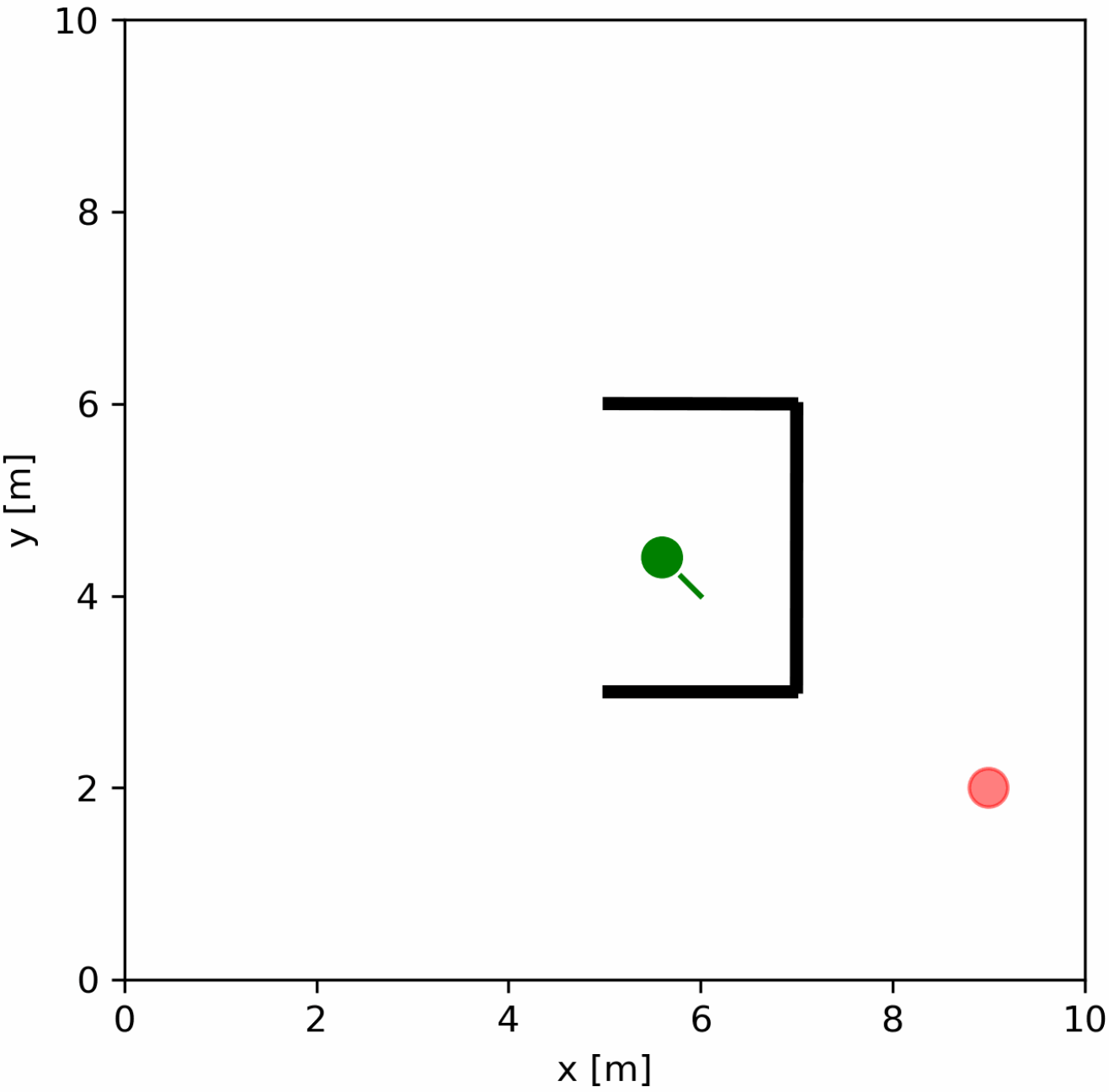


Question 3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