# Markov Decision Processes Worksheet

**CSCI 364: Artificial Intelligence**
**November 12, 2021**

You've been selected to participate in your favorite TV game show: "Millions in Daily Prizes!". The rules of the game are relatively simple:

- There are 10 rounds, and in each round you are asked a single question.
- If you answer the question correctly, you move on to the next round and win an increasing amount of money (given in the table below), otherwise you go home with nothing.
- Before hearing the question of a round, you have a choice to make: you can quit and keep all of your winnings so far, or you can risk your winnings and hear the next question. Once you hear a question, you must answer it.

Because this is your favorite game show, you have spent more hours watching previous episodes than you care to admit. From that experience, you can estimate your probability of correctly answering a question in each round (given in the table below).

| **Round** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
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| **Prize Amount** | $2k | $2k | $4k | $8k | $16k | $32k | $64k | $122k | $250k | $500k |
| **Cumulative Winnings** | $2k | $4k | $8k | $16k | $32k | $64k | $128k | $250k | $500k | $1m |
| **Probability of Correct Answer** | 99% | 90% | 80% | 70% | 60% | 50% | 40% | 30% | 20% | 10% |

**Question**: Given your estimates about how likely you are to answer the question correctly in each round, is there a round in which you would decide to quit early, or would you keep going until you either won or answered incorrectly?

**Reflection Question 1**: What strategies did you use to make your decisions? How would you explain your strategy to a friend?

**Reflection Question 2**: If you increased the prize amount in each round, would it change your decisions? What if you only changed the prize amount in some rounds?

**Reflection Question 3**: If you changed the probabilities of knowing the correct answer in each round, how would that affect your decisions?