3.1

1. Blackjack
    a. States
        i. The cards the actor has
        ii. The amount of money the actor has
    b. Actions
        i. Hit
        ii. Stay
        iii. Bet
        iv. Don't bet
    c. Rewards
        i. Increasing reward for more money
        ii. Decreasing reward for less money
2. Weight loss
    a. States
        i. Current weight
    b. Actions
        i. What to eat
        ii. Workout/don't workout
    c. Rewards
        i. Increasing reward for more weight lost
        ii. Decreasing reward for more weight gained
3. Grid world
    a. States
        i. The current square the actor is in
    b. Actions
        i. Move to a new square
        ii. Don't move to a new square
    c. Rewards
        i. Rewards based on scores of different squares that are predetermined

3.3

I would advocate for using only the angle of the car and the velocity of the wheels in the state calculations as both position and acceleration can be determined with those two pieces of information. Assuming that the angle is measured from world to the wheel angle, position and acceleration can be found using previous position data as time goes on using odometry.

3.4

s	a	s'	r	p(s', r | s, a)
High	Search	High	r_{search}	a
High	Search	Low	r_{search}	1-a

Low	Search	High	-3	1-B
Low	Search	Low	r_{search}	B
High	Wait	High	r_{wait}	1
High	Wait	Low	-	0
Low	Wait	High	-	0
Low	Wait	Low	r_{wait}	1
Low	Recharge	High	0	1
Low	Recharge	Low	1	0

Investing in stocks

Part 1:

    Code included in submission

Part 2:

    The state variables:

- The current amount of money the actor has

    The action variables:

- Stock 1
- Stock 2

    The possible states and actions:

- States
  - The only state is the amount of money the actor has
- Actions
  - Invest in stock 1
  - Invest in stock 2

    The possible rewards each day

- Anywhere from -2% of current money to +8% of current money

Part 3:

    If one wanted to maximize their return, one should always invest in stock 2, as it is uniformly distributed between -2% and +8%, meaning on average, each investment will net a +3% return on investment.