Problem 1: Suppose you're taking the escalator down to Mustek metro station. You want to take a train to Hrandcanska to go home to Kajetanka. You suddenly hear a train approaching. You are close enough to catch it if you start running, but not close enough to see which direction the train is coming from. Your belief of the train going in the direction you want to go is 0.45. If you run and catch the train that goes in your direction, you have a utility gain of 1, but if you run and the train goes in the opposite direction, you have a utility loss of 1.

(a) Without any further signals about which direction the train is going in, would you run?

(b) Now suppose that you see Tomas at the bottom of the escalator, who actually sees the direction in which the train is going (or can infer it from the movement of the people at the station), and who starts running if and only if the train goes in the same direction as he wants to go. You know that Tomas' preferences regarding running or not are the same as yours, except that he may want to go in the other direction than you do. You believe that Tomas wants to go in the same direction as you want to go with a probability p. If Tomas starts running, what is the range of p that would make you run (assume that you run if you're indifferent)? If Tomas does not start running, what is the range of p that would make you run (assume that you run if you're indifferent)?

(c) Now change the scenario a bit. Suppose that you haven't reached the escalators yet, and Tomas is just entering it. You see Tomas, but you don't see down the escalator. But Tomas does, and he sees Jakub at the bottom of the escalator, but does not see the station. The only person who sees the station is Jakub. You know that Tomas and Jakub's preferences regarding running or not are the same as yours. Both you and Tomas also know that Jakub is going to Hrandcanska, but you're not sure whether Tomas is going in the same direction or not. You believe that Tomas wants to go in the same direction as you want to go with a probability p. Now you all hear a train approaching, and if you were to run, each of you would be able to catch the train (because you're super fast). Looking down the escalator, Tomas sees whether Jakub started running, but you don't see it. Also assume, for simplicity, that if you were to start running, you would never see whether Jakub started running or not. If you see Tomas not running, what is the range of p that would make you run? If you see Tomas running, what is the range of p that would make you run?

Problem 2: Assume you need to hire one employee for your firm. You advertise the job opening and 3 prospective employees apply for the position. Your policy is never to hire an employee before interviewing her. Suppose that the constant cost of interviewing is 20 per interview. For any of the three applicants, your priors are that the value to you of hiring this particular applicant continuously uniformly distributed in the interval from 100 to 200. You will hire at most one of the prospective employees, and your objective is to maximize your value net of interviewing costs. What should your hiring strategy be?

Problem 3: You are sequentially meeting 2 potential dates. You know that they are both interested. The quality of your match with either of them is x, which is uniformly distributed between 0 and 1, independently for the two dates. You know that if you reject the first date, you can still go back to him/her with probability p after you have met the second date. You want to maximize the quality of the match you end up with.

(a) If $p = 0$, at least how good must the match with the first date be for you to accept it straight away and not meet the second date?

(b) As a function of p, how good must the match with the first date be for you to accept it straight away and not meet the second date?

Problem 4: You are going to sequentially interview up to three job candidates. The value to you of hiring any particular candidate is uniformly distributed between 100 and 200, independently for each candidate. The cost of interviewing is 6 for the first candidate, 8 for the second candidate, and 10 for the third candidate. After each interview, you either hire the candidate and quit the interviewing process, or you reject the candidate and keep interviewing. Before you start interviewing, what is your expected overall interviewing cost?

Problem 5: You are sequentially meeting 2 potential dates. You know that they are both interested. The quality of your match with either of them is x, which is uniformly distributed between 0 and 1, independently for the two dates. You cannot go back to the first date once you have rejected him/her. But you can start dating the first person and once you meet the second person, you can break up with the first person and move to the second person. However, such breakup has an emotional cost that reduces your enjoyment of the second match by c. You want to maximize the quality of the match net of any emotional costs.

(a) If $c = 0$, at least how good must the match with the first date be for you to start dating this person?

(b) If $c = 0.2$, at least how good must the match with the first date be for you to start dating this person? (Hint: $0.4^{0.5} = 0.632$).

In behavioral economics, hyperbolic discounting refers to the empirical finding that people generally prefer smaller, sooner payoffs to larger, later payoffs when the smaller payoffs would be imminent; but when the same payoffs are distant in time, people tend to prefer the larger, even though the time lag from the smaller to the larger would be the same as before.

Problem 6: Hyperbolic discounting. Consider a consumer faced with a "vice" good like potato chips, which they are tempted to consume rapidly.

The consumer can buy a large (2-serving) or small (1-serving) pack at period 0. In period 1, she must decide how much to consume. If she bought only the small pack, she consumes one serving. If she bought the large pack, she can consume two servings right away, or one serving and save another serving for the future (which is automatically consumed in period 2).

Assume there is positive utility in period 1 from consumption, and negative utility in period 2 (a reduced-form expression for poor health, say). Because the large size has some production economies, it is cheaper, which is reflected in higher immediate consumption utility. The Table below shows numerical utilities. (If she chooses to eat 1 serving from the large pack in period 1, then she gets utility of +3 in period 1, and -2 in period 2, from the second pack.)

Consider a quasi-hyperbolic framework, i.e a discreet time discount function is $\{1, \beta\delta, \beta\delta^2, \beta\delta^3, \ldots\}$. For simplicity assume $\delta = 1$ to focus attention on the β term. Analyze the optimal consumption decisions of three types of agents: Exponential ($\beta = 1, \beta' = 1$); naive hyperbolic ($\beta < 1, \beta' = 1$); and sophisticated hyperbolic ($\beta < 1, \beta' = \beta$). Exponential agent has all the time discount rate 1. For naive hyperbolic consumer from the perspective of Period 0 the relative value of a serving at Period 2 to the value at Period 1 is $\beta/\beta = 1$. However, from the perspective of Period 1, the relative value of a serving at Period 2 to the value at Period 1 is $\beta/1 = \beta$. So the value of consumption in Period 2 is lower relative to consumption in Period 1. The same is true for sophisticated hyperbolic consumer but he is aware of this future temptation and therefore he will take this into consideration when deciding what pack to buy.

Purchase Decision Consumption Decision	Instantaneous Utility in Period 1	Instantaneous Utility in Period 2
Small		
1 serving	2.5	-2
Large		
1 serving	3	-2
2 servings	6	-7

For each agent, figure out:

(i) What will they expect to do, at time 0, if they buy either the large or small packages?

(ii) Given your answer in (i), which package will the period-0 "self" purchase, for each of the three types?

(iii) After they buy their optimal package, how much will they consume in period 1?

(iv) Which of the type's (if any) plans embedded in (i) are actually violated in (iii)

(v) Suppose agents could purchase external commitment, in which they could only consume 1 of the 2 servings in the large pack in period 1, at a price of $P > 0$ (think of this as buying pre-packaged dietary portions of food). Which agents would commit at time zero to pay P, and how much would they pay?