

## Cost-benefit analysis

1. Jamal has a very flexible job this summer. He works all day but can take a day off whenever he wants. His friend Don suggests taking Tuesday off and going to the amusement park. The entrance fee is 15\$ per person; gas and parking cost 5\$ each. Jamal loves amusement parks; for him, spending a day at the park is worth 45\$. However, he also enjoys his work so much that he would even be willing to pay 10\$ a day to do it.
  - a) If Jamal earns 10\$ by working, should he go to the amusement park?
  - b) What if he earns 15\$?
  - c) And what if he earns 20\$?
2. Tom grows mushrooms. He invests all his savings in more mushrooms, which he cultivates on a plot of land behind his barn that would otherwise be useless. The size of the mushrooms doubles during the first year, when he harvests and sells them at a constant price per pound. His friend Dick asks to borrow 200\$ from him and promises to return it within 1 year. How much interest will Dick have to pay Tom so that Tom is not worse off than if he hadn't made the loan?
3. University A's meal plan allows students to eat as much as they want for a fixed semester fee of 500\$. The average student at that university consumes 250 pounds of food per semester. University B charges students 500\$ for a meal voucher book that entitles them to eat 250 pounds of food per semester. If the student eats more than 250 pounds, they pay an additional amount; if they eat less, they get a refund. If the students are rational, at which university will the average food consumption be higher?

## Solutions

1. (a) We calculate the cost of the park assuming he only pays for his own ticket and not Don's:  $\$15 + \$5 + \$5 = \$25$ . The benefit would be what he values it at:  $\$45$ . On the other hand, if he does not go to the park, he can work, earning  $\$10$  plus the extra enjoyment worth  $\$10$ . Therefore, going to the park in net terms is  $\$45 - \$25 = \$20$ , while working yields  $\$10 + \$10 = \$20$ . **He is indifferent between the two options.**
- (b) If he earns  $\$15$ , his total gain would be:  $\$10 + \$15 = \$25$ . **Therefore, he would prefer to work.**
- (c) If he earns  $\$20$ , he would still prefer to work, as he would earn  $\$10 + \$20 = \$30$ . **This is still greater than the  $\$20$  he gains from going to the amusement park.**

2. If Tom does not lend the money, he can use the  $\$200$  to grow mushrooms, which double in size. After a year, he would have  $\$400$  worth of mushrooms. Therefore, the interest Dick would have to pay is 100%. **That is, he should return  $\$200$  in interest to leave Tom indifferent between growing mushrooms or lending the money.**
3. **At University A, the average food consumption will be higher because there are no additional costs for eating more than 250 pounds,** while at the other university, there are incentives to eat less and receive a refund.