Problem of the Week
Problem B and Solution
Server Satisfaction

Problem

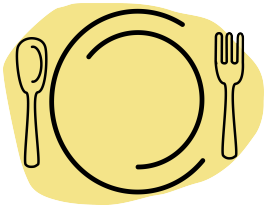
You've just enjoyed a delicious meal at a restaurant with your friend. The cost of the meal before tax and tip was $35.10.

(a) Suppose the tax is 15% of the total cost. Estimate the dollar amount of tax using a mental math strategy. Then calculate the actual dollar amount of tax, and total cost including tax.

(b) If you want to tip the server an additional 20% after tax, how much would you pay in total?

(c) How much change would you receive if you paid with a $100 bill?

Extension: Suppose you are a server. In general, when would you rather receive a $20 tip instead of 20% of your bill? Justify your thinking.



Solution

(a) To estimate the dollar amount of tax, we could first round the total cost to $35. Then we could think of 15% as 10% + 5%. Since 10% of $35 is $3.50, and half of that is $1.75, we can estimate that the dollar amount of tax is $3.50 + $1.75 = $5.25.

The actual dollar amount of tax is $35.10 × 0.15 = $5.265, which rounds to $5.27. Thus, the total cost including tax is $35.10 + $5.27 = $40.37.

(b) If you want to tip the server an additional 20%, then we need to calculate 20% of $40.37. We know that 10% of $40.37 is $4.037. We then double that to get 20%, which is $8.074. Rounded to the nearest cent, this is $8.07. Finally, adding that to the total cost including tax gives $40.37 + $8.07 = $48.44.

(c) If you paid with a $100 bill, your change would be $100 − $48.44 = $51.56.

Extension: When 20% of the total cost including tax is less than $20, then a $20 tip would likely be preferred. When 20% of the total cost including tax is greater than $20, then a tip of 20% would likely be preferred.