Conditions

Learning Objectives

1. Trace code that uses conditions to solve a programming problem.
2. Explain how code changes can have beneficial or detrimental social impacts on stakeholders.

Process Skills

1. Information Processing. Extract key information about the tipping algorithm.
2. Assessment. Reflect on the impact of one's designs on stakeholders.

Please fill in the roles for each member of your team. Take a look at the description of each role to see its responsibilities. If there are only three people in the group, please assign the same person to the **Presenter** and **Reflector** role. It is a good idea to select roles that you have not recently taken.

Team name: _____ Date: _____

Role	**Team Member Name**
Manager. Keeps track of time and makes sure everyone contributes appropriately.	
Presenter. Talks to the facilitator and other teams.	
Reflector. Considers how the team could work and learn more effectively.	
Recorder. Records all answers and questions and makes the necessary submission.	

Model 1. Conditions (10 min) Start time: _____

Imagine a small, fast-food restaurant that uses a system to compute tip splits among its employees. It has **only four employees**: a cashier, a chef, a server, and a manager. The cashier takes orders and receives payments. The chef takes orders and prepares the food. The server takes food from the kitchen to the customer, takes customer requests, and cleans the restaurant. The manager tracks employees' pay, handles employee requests and accommodates customer requests.

As you've read in the prereading activity, there are different types of tipping strategies. The program below applies percentage tip-outs that will be used to split tips given by customers. In addition, it also considers cases when there is a sudden surge of customers, in this case, over 10 customers. When this happens, the manager steps in to help the team. The restaurant decided that the manager will receive part of the tip to compensate for their effort to help the team.

```
#include <iostream>

void DisplayTipSplit(double total_tip, int num_customers) {
  const int k_too_many_customers = 10;
  std::cout << "Tip split:\n";
  if (num_customers < k_too_many_customers) {
    std::cout << "Cashier: $" << total_tip * 0.2 << "\n";
    std::cout << "Chef: $" << total_tip * 0.3 << "\n";
    std::cout << "Server: $" << total_tip * 0.5 << "\n";
  } else {
    std::cout << "Cashier: $" << total_tip * 0.2 << "\n";
    std::cout << "Chef: $" << total_tip * 0.3 << "\n";
    std::cout << "Server: $" << total_tip * 0.45 << "\n";
    std::cout << "Manager: $" << total_tip * 0.05 << "\n";
  }
}
int main() {
  DisplayTipSplit(150.00, 12);
  return 0;
}
```

Output:
Tip split:
Cashier: $30
Chef: $45
Server: $67.5
Manager: $7.5

1. Review the call to the DisplayTipSplit function in main. When it passes 150.00 and 12 as arguments, what values are stored in the total_tip and num_customers parameters of the DisplayTipSplit function? Provide your answers in the table below

parameter	**value**
total_tip	150.00
num_customers	12

2. Write the equation that was used to compute the cashier's split of the tip ($30).

```
total_tip * 0.2
```

3. Write the equation that was used to compute the server's split of the tip when there were over 10 customers ($67.5).

```
total_tip * 0.45
```

4. Assume the arguments 150.00 and 2 are passed to the DisplayTipSplit function. Will the code block associated with the if statement run? Place a check (✓) beside your answer.

    a. No, because the value of num_customers is greater than k_too_many_customers.
    b. Yes, because the value of num_customers is less than k_too_many_customers. ✓
    c. There is a syntax error because the if statement only accepts boolean expressions as the condition.

5. Assume the arguments 358.50 and 10 are passed to the DisplayTipSplit function. Which code block will be executed? Place a check (✓) beside your answer.

    a. The code block following the if statement
    b. The code block following the else statement ✓
    c. The code block after the if-else statement blocks.

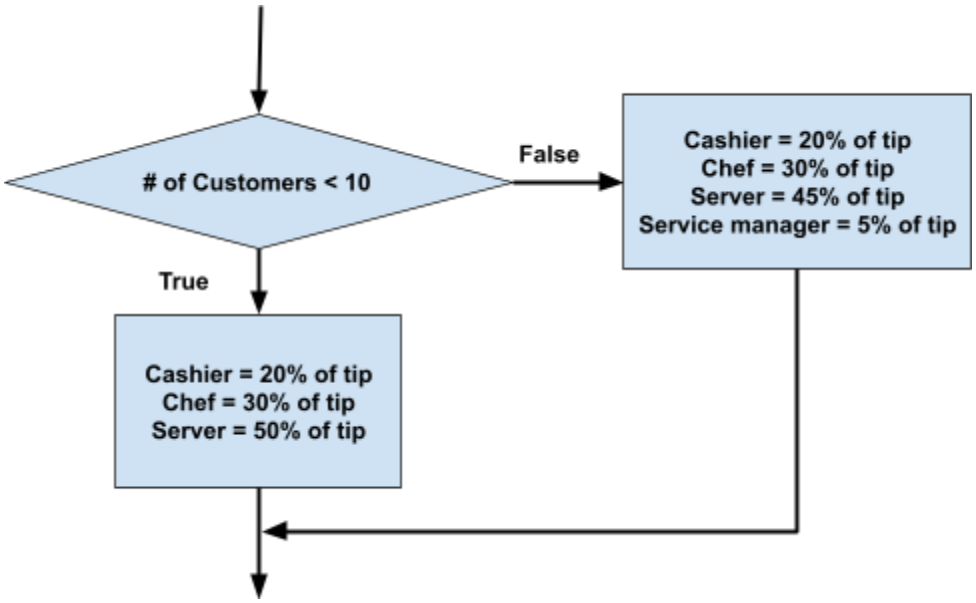
6. Assume the arguments to the DisplayTipSplit function are 100.00 and 3. Trace the code to predict the output and write it in the box below.

```
Tip split:
Cashier: $20
Chef: $30
Server: $50
```

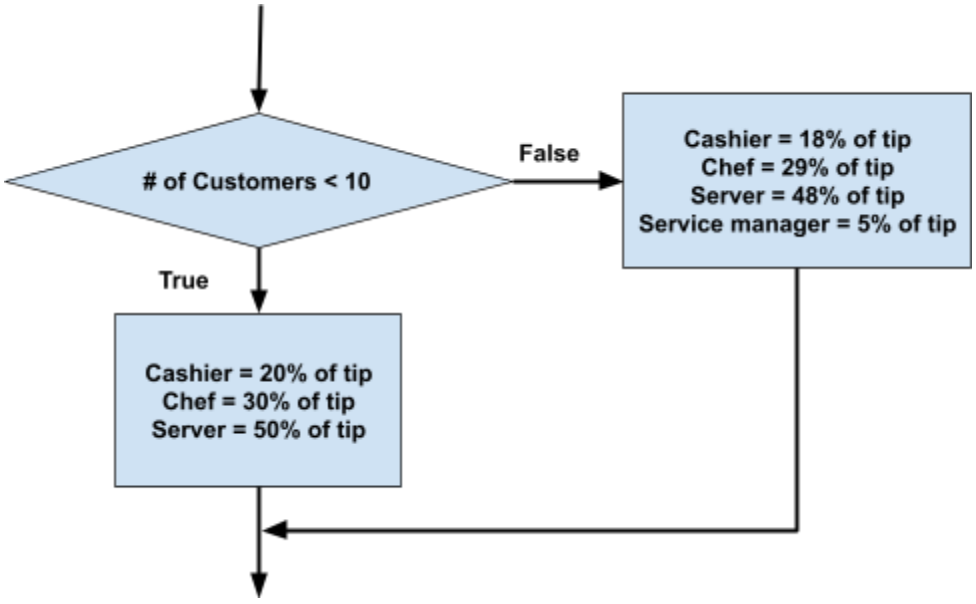
Model 2. Tipping strategies (20 min) Start time: _____

Imagine a fastfood restaurant manager deciding on how to split tips among their employees. As described in Model 1, when there are fewer than 10 customers, the manager works in the back of the restaurant. Otherwise, when the store is very busy, the manager helps the cashier, and gets some of the tips in this case. Consider the two tipping strategies illustrated below.

Tip split strategy 1



Tip split strategy 2



7. Compare the two tipping strategies. When will both strategies use the same split among workers? Place a check (✓) beside your answer.

    a. Less than 10 customers ✓
    b. Over 10 customers
    c. Exactly 10 customers

8. Which employee receives the most percentage of the tips using Tip Split strategy 1 with less than 10 customers? Place a check (✓) beside your answer.

    a. Chef
    b. Cashier
    c. Server ✓

9. Why does your group think servers get the most percentage from tips? Place a check (✓) beside your answer. Place a check (✓) beside your answer.

    a. they do more work than others ✓
    b. customers decide how much they tip according to interactions with the server
    c. they do the most difficult work
    d. other (write your explanation below):

10. According to Tip Split Strategy 1, which employee will share most of their tips with the manager when the number of customers exceeds 10? Place a check (✓) beside your answer.

    a. Cashier
    b. Chef
    c. Server ✓

11. According to Tip Split Strategy 2, which employee will share most of their tips with the manager when the number of customers exceeds 10? Place a check (✓) beside your answer.

    a. Cashier
    b. Chef
    c. Server ✓

12. An algorithm has a *social impact* when it affects people or communities in some way (e.g., finances). Does the tipping strategy have a social impact? Place a check (✓) beside your answer.

    a. Yes ✓
    b. No

13. **Power-over** involves an entity (e.g., a person or a software system) having power over another entity (a person or some system). Does the system have power over the employees when it computes for the tip split? Place a check (✓) beside your answer.

    a. Yes ✓
    b. No

14. Discuss as a group which tip split strategy is fairer to all employees, and indicate your answer below.

    a. Tip Split Strategy 1
    b. Tip Split Strategy 2 ✓

15. Brainstorm as a group to think of another tip split strategy that you think is fairer than the two you've seen from this worksheet. You are free to consider other factors that are outside of the ones described in the examples above (e.g., day of the week, holiday, location, etc.). Describe or illustrate your tipping strategy in the box below.

The tips are based on the hours worked and the type of work done. That way, if it is faster for the person to finish their work, they get less than another who spends more time completing their work. First, divide the tips by the total number of hours in operation. Cashier - 20% of the hourly tip x number of hours worked Chef - 30% of the hourly tip x number of hours worked Server - 45% of the hourly tip x number of hours worked Manager - 5% of the hourly tip x number of hours worked

16. [Extra challenge! (Optional)] Create a function that implements your tipping strategy. Make sure to use the factors you identified as parameters to your function and display the tip split among the four employees (i.e., cashier, server, chef, shift manager) on the screen.

Reflector questions

1. What was the most useful thing your team learned during this session?

2. Recall your experience answering Model 1. What did you do as a group to find the answers to questions 1 - 5?

3. Explain how this exercise changed your perspective on how much programs you might build in the future can affect other people.