Lab 05: Selection Statements

CSE 4108

Structured Programming I Lab

September 2022

Lab Tasks

1. **Counting Digits:**

Students of International University of Tokyo (IUT) are famous for counting things. Anything you ask them, from flag stands, fields, departments, lakes, even leaves of trees, they can immediately tell you their count. The difficulty of such an answer depends on how many digits are there in that count. The more the difficulty, the greater the reward. Alice, a freshman at IUT, wants to know the reward she's going to get from answering questions. She knows the answers but she wants an automated system to find out the difficulty of each answer. Being her friend, the responsibility has fallen on your hands to help her.
Write a program that calculates how many digits a number contains.

Sample run:
Enter a number: 57
The number 57 has 2 digits
You may assume that the number has no more than four digits.

2. **Time Converter:**

Write a program that asks the user for a 24-hour time, then displays the time in 12-hour form:
Enter a 24-hour time: 21 : 11
Equivalent 12-hour time: 9:11 PM
Be careful not to display 12 : 00 as 0 : 00.

3. **Broking Bad:**

When stocks are sold or purchased through a broker, the broker's commission often depends upon the value of the stocks traded.

Suppose that a broker charges the amounts shown in the following table:

Transaction size	***Commission rate***
Under $2,500	$30 + 1.7%
$2,500–$6,250	$56 + 0.66%
$6,250–$20,000	$76 + 0.34%
$20,000–$50,000	$100 + 0.22%
$50,000–$500,000	$155 + 0.11%
Over $500,000	$255 + 0.09%

The minimum charge is $39

The *broker.c* program asks the user to enter the amount of the trade, then displays the amount of the commission:

Enter value of trade: 30000
Commission: $166.00

Now, modify the *broker.c* program by making both of the following changes:

(a) Ask the user to enter the number of shares and the price per share, instead of the value of the trade.

(b) Add statements that compute the commission charged by a rival broker ($33 plus 3% per share for fewer than 2000 shares; $33 plus 2% per share for 2000 shares or more).

Display the rival's commission as well as the commission charged by the original broker.

4. **Beaufort Scale:**

Wind force is estimated by Beaufort Scale. Here's a simplified version of the scale:

Speed (knots)	***Description***
Less than 1	Calm
1-3	Light air
4-27	Breeze
28-47	Gate
48-63	Storm
Above 63	Hurricane

Write a program that asks the user to enter a wind speed (in knots), then displays the corresponding description.

5. **Check Digit:**

Modify the *upc.c* program from the previous lab so that it checks whether a UPC is valid. After the user enters a UPC, the program will display either VALID or NOT VALID

6. **Tax Season:**

In one state, single residents are subject to the following income tax:

Income	***Amount of Tax***
Not over $750	1% of income
$750 - $2250	$7.50 plus 2% of amount over $750
$2250 - $3750	$37.50 plus 3% of amount over $2250
$3750 - $5250	$82.50 plus 4% of amount over $3750
$5250 - $7000	$142.50 plus 5% of amount over $5250
Over $7000	$230.00 plus 6% of amount over $7000

Write a program that asks the user to enter the amount of taxable income, then displays the tax due.

7. **Condition Calamity:**

Write a program that finds the largest and smallest of four integers entered by the user:

Enter four integers: 21 43 10 35
Largest: 43
Smallest: 10
Use as few if statements as possible.

8. **Welcome Aboard:**

The following table shows the daily flights from one city to another:

Departure time	***Arrival time***
8:00 a.m.	10:16 a.m.
9:43 a.m.	11:52 a.m.
11:19 a.m.	1:31 p.m.
12:47 p.m.	3:00 p.m.
2:00 p.m.	4:08 p.m.
3:45 p.m.	5:55 p.m.
7:00 p.m.	9:20 p.m.
9:45 p.m.	11:58 p.m.

Write a program that asks the user to enter a time (expressed in hours and minutes, using the 24-hour clock). The program then displays the departure and arrival times for the flight whose departure time is closest to that entered by the user.

Sample run:

Enter a 24-hour time: 13 : 15
Closest departure time is 12:47 p.m., arriving at 3:00 p.m.

9. **Early Date:**

Write a program that prompts the user to enter two dates and then indicates which date comes earlier on the calendar.

Sample run:

Enter first date (mm/dd/yy): 12/21/19
Enter second date (mm/dd/yy): 2/16/20
12/21/19 is earlier than 2/16/20

10. **GPA Calculator:**

Using the switch statement, write a program that converts a numerical grade into a letter grade.

Sample run:

Enter numerical grade: **84**

Letter grade: B

Use the following grading scale: A = 90-100, B = 80-89, C = 70-79, D = 60-69, F = 0-59.

Print an error message if the grade is larger than 100 or less than 0.

11. **Number Translator:**

Write a program that asks the user for a two-digit number, then prints the English word for the number.

Sample run:

Enter a two-digit number: 45

You entered the number forty-five