Week 2
Course: Introduction to programming 2
Theme: Conditional statement, logical operators, while loop, for loop, strings

Part 1. Theoretical Exercise

1. A _____ structure can execute a set of statements only under certain circumstances.
a. sequence
b. circumstantial
c. decision
d. Boolean
2. A _____ structure provides one alternative path of execution.
a. sequence
b. single alternative decision
c. one path alternative
d. single execution decision
3. A(n) _____ expression has a value of either true or false.
a. binary
b. decision
c. unconditional
d. Boolean
4. The symbols , , and == are all _____ operators.
a. relational
b. logical
c. conditional
d. ternary
5. A(n) _____ structure tests a condition and then takes one path if the condition is true, or another path if the condition is false.
a. if statement
b. single alternative decision
c. dual alternative decision
d. sequence
6. You use a(n) _____ statement to write a single alternative decision structure.
a. test-jump
b. if
c. if-else
d. if-call
7. You use a(n) _____ statement to write a dual alternative decision structure.
a. test-jump
b. if
c. if-else
d. if-call
8. and, or, and not are _____ operators.
a. relational
b. logical
c. conditional
d. ternary
9. A compound Boolean expression created with the _____ operator is true only if both of its subexpressions are true.
a. and
b. or
c. not
d. both
10. A compound Boolean expression created with the _____ operator is true if either of its subexpressions is true.

a. and
b. or
c. not
d. either

11. The _____ operator takes a Boolean expression as its operand and reverses its logical value.
a. and
b. or
c. not
d. either

12. A _____ is a Boolean variable that signals when some condition exists in the program.
a. flag
b. signal
c. sentinel
d. siren

True or False

1. You can write any program using only sequence structures.
2. A program can be made of only one type of control structure. You cannot combine structures.
3. A single alternative decision structure tests a condition and then takes one path if the condition is true, or another path if the condition is false.
4. A decision structure can be nested inside another decision structure.
5. A compound Boolean expression created with the and operator is true only when both subexpressions are true.

Short Answer

1. Explain what is meant by the term "conditionally executed."
2. You need to test a condition and then execute one set of statements if the condition is true. If the condition is false, you need to execute a different set of statements. What structure will you use?
3. Briefly describe how the and operator works.
4. Briefly describe how the or operator works.
5. When determining whether a number is inside a range, which logical operator is it best to use?
6. What is a flag and how does it work?

Part 2. Programming Exercise

1. In this exercise you will create a program that reads a letter of the alphabet from the user. If the user enters a, e, i, o or u then your program should display a message indicating that the entered letter is a vowel. If the user enters y then your program should display a message indicating that sometimes y is a vowel, and sometimes y is a consonant. Otherwise your program should display a message indicating that the letter is a consonant.

2. Write a program that determines the name of a shape from its number of sides. Read the number of sides from the user and then report the appropriate name as part of a meaningful message. Your program should support shapes with anywhere from 3 up to (and including) 10 sides. If a number of sides outside of this range is entered then your program should display an appropriate error message.

3. The length of a month varies from 28 to 31 days. In this exercise you will create a program that reads the name of a month from the user as a string. Then your program should display the number of days in that month. Display "28 or 29 days" for February so that leap years are addressed.

4. The year is divided into four seasons: spring, summer, fall and winter. While the exact dates that the seasons change vary a little bit from year to year because of the way that the calendar is constructed, we will use the following dates for this exercise:

Season	First day
Spring	March 20
Summer	June 21
Fall	September 22
Winter	December 21

Create a program that reads a month and day from the user. The user will enter the name of the month as a string, followed by the day within the month as an integer. Then your program should display the season associated with the date that was entered.

5. At a particular university, letter grades are mapped to grade points in the following manner:

Letter	Grade points
A+	4.0
A	4.0
A−	3.7
B+	3.3
B	3.0
B−	2.7
C+	2.3
C	2.0
C−	1.7
D+	1.3
D	1.0
F	0

Write a program that begins by reading a letter grade from the user. Then your program should compute and display the equivalent number of grade points. Ensure This copy belongs to 'acha04'24 2 If Statement Exercises that your program generates an appropriate error message if the user enters an invalid letter grade.

6. In this exercise you will create a program that computes the average of a collection of values entered by the user. The user will enter 0 as a sentinel value to indicate that no further values will be provided. Your program should display an appropriate error message if the first value entered by the user is 0. Hint: Because the 0 marks the end of the input it should not be included in the average.

7. Write a program that displays a temperature conversion table for degrees Celsius and degrees Fahrenheit. The table should include rows for all temperatures between 0 and 100 degrees Celsius that are multiples of 10 degrees Celsius. Include appropriate headings on your columns. The formula for converting between degrees Celsius and degrees Fahrenheit can be found on the internet.

8. A particular zoo determines the price of admission based on the age of the guest. Guests 2 years of age and less are admitted without charge. Children between 3 and 12 years of age cost $14.00. Seniors aged 65 years and over cost $18.00. Admission for all other guests is $23.00.

9. Create a program that begins by reading the ages of all of the guests in a group from the user, with one age entered on each line. The user will enter a blank line to indicate that there are no more guests in the group. Then your program should display the admission cost for the group with an appropriate message. The cost should be displayed using two decimal places.

10. Create a program that generates a multiplication table for a user-specified number. The program should prompt the user for a number, then generate and display the multiplication table for that number from 1 to 10. To achieve this, you will need to use both for and while loops. A for loop will iterate from 1 to 10 to generate the table, while a while loop will handle user input validation.