Aatif Sayed

Professor Andy Guna

CS111: Introduction to Computer Science

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Pseudocode Assignment

1. "*Gas*" Problem
    a. Inputs:
        i. Price per gallon
        ii. Number of gallons of gas that were purchased
        iii. Whether person pays by cash or credit
    b. Outputs:
        i. The price a person will pay for gas
    c. Error Conditions:
        i. Zero (0) being inputted
        ii. If no payment method is specified (neither cash nor credit)
    d. Pseudocode Algorithm:

```
READ pricePerGallon
READ numGallons
READ cash(boolean)
READ credit(boolean)
IF pricePerGallon <= 0 OR numGallons <= 0 THEN
        DISPLAY errorMessage: "Neither the price per gallon nor the number of gallons purchased can be 0 or negative."
ENDIF
IF cash(boolean) is false AND credit(boolean) is false THEN
        DISPLAY errorMessage: "Please specify a payment method."
ENDIF
COMPUTE totalPrice AS pricePerGallon * numGallons
IF credit(boolean) is true THEN
        COMPUTE totalPrice AS totalPrice * 1.1
ENDIF
DISPLAY totalPrice
```

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e. Test cases:

pricePerGallon	numGallons	cash(boolean)	credit(boolean)	totalPrice
0	-	-	-	ERROR
-	-2	-	-	ERROR
3	5	true	false	15
2	8	false	true	17.6
-	-	false	false	ERROR
-2.5	-	-	-	ERROR
-	-4	-	-	ERROR

f. Minimum number of operations: 7

g. Maximum number of operations: 12

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2. "*Train Ticket for One Person*" Problem
    a. Inputs:
        i. Person's age
        ii. Whether the ticket is bought at the station (yes/no)
        iii. Whether the ticket is bought on the train (yes/no)
    b. Outputs:
        i. Price of a ticket
    c. Error Conditions:
        i. Age being less than 0 (no negative numbers allowed as inputs)
        ii. Age being above 120
        iii. If no location of where the ticket was bought is specified (neither at station nor in train)
    d. Pseudocode Algorithm:

```
READ age
READ station(boolean)
READ train(boolean)
IF station(boolean) is false AND train(boolean) is false THEN
        DISPLAY errorMessage: "Please specify a location where the ticket was bought (either at the station or on the train)."
IF age < 0 OR age > 120 THEN
        DISPLAY errorMessage: "Age cannot be below 0 or above 120."
ELSE IF age < 7 THEN
        SET price TO 0
ELSE IF age > 65 THEN
        SET price TO 7.5
ELSE
        SET price TO 13.2
ENDIF
IF train(boolean) is true THEN
        COMPUTE price AS price * 1.2
ENDIF
DISPLAY price
```

    e. Test cases:

age	station(boolean)	train(boolean)	price
-2	-	-	ERROR
145	-	-	ERROR
-	false	false	ERROR
4	true	false	0
82	false	true	9
43	false	true	15.84
43	true	false	13.2

f. Minimum number of operations: 6
g. Maximum number of operations: 13

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3. "*WCS111 FM*"Problem
    a. Inputs:
        i. Number of hours spent programming per month
    b. Outputs:
        i. The prize that is received
    c. Error Conditions:
        i. Number of hours inputted is less than 0 (negative)
    d. Pseudocode Algorithm:

```
READ hours
IF hours < 0 THEN
    DISPLAY errorMessage: "Number of hours spent programming cannot be a negative number."
ELSE IF hours = 0 THEN
    Set prize TO nothing
ELSE IF hours >= 1 AND hours <= 5 THEN
    SET prize TO tshirt
ELSE IF hours >= 6 AND hours <= 400 THEN
    IF (hours + 1) % 10 = 0 THEN
        SET prize TO laptop
    ENDIF
    IF hours % 2 = 0 THEN
        SET prize TO hat
    ENDIF
    IF hours % 3 = 0 THEN
        SET prize TO tv
    ENDIF
    IF hours % 2 = 0 AND hours % 3 = 0 THEN
        SET prize TO hat and tv
    ENDIF
    IF (hours + 1) % 10 = 0 AND hours % 3 = 0 THEN
        SET prize TO laptop and tv
```

ENDIF

IF (hours + 1) % 10 != 0 AND hours % 2 != 0 AND hours % 3 != 0 THEN

SET prize TO nothing

ENDIF

ELSE

SET prize TO cat

ENDIF

DISPLAY prize

e. Test cases:

hours	**prize**
-2	ERROR
0	nothing
4	shirt
19	laptop
8	hat
15	tv
9	laptop and tv
6	hat and tv
7	nothing
561	cat

f. Minimum number of operations: 3

g. Maximum number of operations: 26

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4. "*Lucky Sevens*" Problem
    a. Inputs:
        i. Whole number
    b. Outputs:
        i. The number of sevens that appear in the given whole number
    c. Error Conditions:
        i. Whole number inputted cannot be negative
    d. Pseudocode Algorithm:

```
READ number
SET count AS 0
IF number < 0 THEN
        DISPLAY errorMessage: "Number inputted must be a positive integer."
ENDIF
WHILE number != 0
        IF number % 10 = 7 THEN
                ADD 1 TO count
        ENDIF
        COMPUTE number AS number / 10
ENDWHILE
DISPLAY count
```

    e. Test cases:

number	count
-7	ERROR
37227773	4
70707	3
7	1
1023	0

    f. Minimum number of operations: 4
    g. Maximum number of operations: 5 + 3n (where n is number of digits in the given whole number)

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