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Practice Exam - Heat Shield Testing
Created by Lucas E. Tijerina
EGR 115 Section 8
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Purpose: The purpose of this program is to determine the percentage of how
much each piece of the heat shield has been damaged and assess if it will be
safe or not.
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%           couple fixes I did but OVERALL: very good.

% Clean up commands

clc;
clear;
close all;

% Greet the user

fprintf('Hello user! Welcome to Heat Shield Evaluator, please follow all of the
instructions\n');
fprintf('provided in the prompts so that this program runs correctly\n\n'); %**

% 1. Prompt the engineer for values

pieces = input('How many pieces of heat shield were used (>=3)? Input here: '); %**

while pieces < 3 || floor(pieces)~=pieces % 2. Trap user if incorrect inputs %**
    pieces = input('ERROR: (whole>=3): ');
end

damage = input('How much percentage of damages is acceptable? (10-70 where 10 = 10%)
Input here: ');

while damage < 10 || damage > 70 % 2. Trap user if incorrect inputs
    damage = input('ERROR: (Input between 10 and 70 both included): ');
end

% 3. Initiate Running Variables

running_area = 0;
running_dam = 0;

for k = 1:pieces % 4. Loop to process variables and display data

    %surface area of each shield **

    fprintf('\nWhat is the surface area of shield #d (15 <= s <= 70 cm^2)', k);
    surf_area(k) = input(' Input here: '); % Area vector
    running_area = running_area + surf_area(k);

    % damage of each shield **

    dam_percentage = rand*90 + 10; % Damage
    running_dam = running_dam + dam_percentage*surf_area(k)/100;
    present_dam(k) = dam_percentage*surf_area(k)/100; % Area destroyed for each piece
    fprintf('Shield %d is %.1f%% destroyed (%.1f cm^2)\n', k, dam_percentage, present_dam
(k)); %**

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end

% 5. Calculate total damage and display

total_dam = running_dam*100/running_area;
fprintf('The total damage percentage of the heat shield is %.2f%%\n', total_dam);

% 6. Decide whether it is safe or not

if total_dam > damage

    fprintf('The heat shield is not safe!\n'); %**

else

    fprintf('The heat shield is good to go!\n'); %**

end

% 7. Plot bar graph

bar([present_dam ; surf_area]', 'stacked'); %**
xlabel('Heat Shield Number');
ylabel('Surface Area (cm^2)');
title('Damaged sustained by each shield');
legend('Damaged Portion', 'Total Surface Area');

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Test 1 - Wrong inputs

Hello user! Welcome to Heat Shield Evaluator, please follow all of the instructions
provided in the prompts so that this program runs correctly
How many pieces of heat shield were used? Input here: -1
ERROR: (whole>=3): 1
ERROR: (whole>=3): 3.5
ERROR: (whole>=3): 3
How much percentage of damages is acceptable? (10-70 where 10 = 10%) Input here: 9
ERROR: (Input between 10 and 70 both included) 75
ERROR: (Input between 10 and 70 both included) -1
ERROR: (Input between 10 and 70 both included) 50

What is the surface are of shield #1 (15 <= s <= 70 cm^2) Input here: 20
Shield 1 is 81.3% destroyed (16.3 cm^2)

What is the surface are of shield #2 (15 <= s <= 70 cm^2) Input here: 25
Shield 2 is 96.4% destroyed (24.1 cm^2)

What is the surface are of shield #3 (15 <= s <= 70 cm^2) Input here: 30
Shield 3 is 69.0% destroyed (20.7 cm^2)
The total damage percentage of the heat shield is 81.40%
The heat shield is not safe!>>

Test 2 - Correct Inputs

Hello user! Welcome to Heat Shield Evaluator, please follow all of the instructions
provided in the prompts so that this program runs correctly
How many pieces of heat shield were used? Input here: 4
How much percentage of damages is acceptable? (10-70 where 10 = 10%) Input here: 40

What is the surface are of shield #1 (15 <= s <= 70 cm^2) Input here: 20
Shield 1 is 13.2% destroyed (2.6 cm^2)

What is the surface are of shield #2 (15 <= s <= 70 cm^2) Input here: 30

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Shield 2 is 86.4% destroyed (25.9 cm<sup>2</sup>)

What is the surface are of shield #3 (15 <= s <= 70 cm<sup>2</sup>) Input here: 40

Shield 3 is 94.1% destroyed (37.6 cm<sup>2</sup>)

What is the surface are of shield #4 (15 <= s <= 70 cm<sup>2</sup>) Input here: 15

Shield 4 is 71.1% destroyed (10.7 cm<sup>2</sup>)

The total damage percentage of the heat shield is 73.20%

The heat shield is not safe!>>

%}