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CPS 150 02 – Algorithms and Programming 1

Lab Group Project 3

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**Problem 1 Pseudocode**

Declare values for location (L), boom width (w), boom height (h), and yield

Ask user for values of force (F) and angle (θ) using message box

Calculate stress -- stress = 6FLcosθ/(wh^2)

if stress >= yield

stress = yield

else

stress remains the same as outside of the loop (don’t need an else statement for it)

print out the value of stress in MPa using message box

**Problem 2 Running Screenshot**

**Graphical user interface, application

Description automatically generated**

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**Problem 2 Code**

/\*

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CalculatingStress: number number; number

program takes in a value from the user for the angle and force

and uses these values to calculate/output the value for stress

stress = 6FLcosθ/(wh^2) -- unless this number is >= yield

ex1: user inputs 5000, 0 - program outputs 46.08

ex2: user inputs 60, 90- program outputs 0 (basically)

ex3: user inputs 51692, 5.5- program outputs 225.0

ex4: user inputs x, yard - program outputs error

ex5: user inputs -6357, 81 - program outputs -9.164

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//import JOption class

import javax.swing.JOptionPane;

public class CalculatingStress {

public static void main(String [] args){

//declare and define variables given in table

double location = 1800;

double height = 125;

double width = 75;

double yield = 225;

//prompt the user to enter a value for the force and declare a variable to store that value

String input1 = JOptionPane.showInputDialog("Please enter the force (N): ");

double force = Double.parseDouble(input1);

//prompt the user to enter a value for the angle and declare a variable to store that value

String input2 = JOptionPane.showInputDialog("Please enter the angle (degrees): ");

double angle = Math.toRadians(Double.parseDouble(input2));

StressCalculator(location, height, width, yield, force, angle);

}

public static void StressCalculator(double a, double b, double c, double d, double e, double f){

//location = a, height = b, width = c, yield = d, force = e, angle = f

double stress = 6 \* e \* a \* Math.cos(f) / (c \* Math.pow(b, 2));

//use if statement to determine if stress will be equal to yield or not

if(stress >= d){

stress = d;

}

//print the value of stress

JOptionPane.showMessageDialog(null,"The value of stress is " + stress + " MPa");

}

}

**Problem 3 Table**

Boom Stress (MPa)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Force (N) |  |  |
|  |  | 5000 | 10000 | 15000 | 20000 | 25000 |
|  | 0 | 46.08 | 92.16 | 138.24 | 184.32 | 225 |
|  | 5 | 45.9 | 91.81 | 137.71 | 183.62 | 225 |
|  | 10 | 45.38 | 90.76 | 136.14 | 181.52 | 225 |
| Angle (degrees) | 15 | 44.51 | 89.02 | 133.53 | 178.04 | 222.55 |
|  | 20 | 43.3 | 86.6 | 129.9 | 173.2 | 216.51 |
|  | 25 | 41.76 | 83.53 | 125.29 | 167.05 | 208.81 |
|  | 30 | 39.91 | 79.81 | 119.72 | 159.63 | 199.53 |

(I decided not to round the stress calculations by the way)