

PSEUDOCODE

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WHAT IS PSEUDOCODE?

- Pseudocode is an informal description of what your code intends to do
 - It allows programmers to express their logical steps in a readable format
 - Forces programmers to organise their thoughts
 - Allows others to check your logic before you code
- Major pseudocode components:
 - Variables, assignment, input/output, conditions, repetition
- Thinking ahead reduces the amount of errors/hurdles during the programming stage

PSEUDOCODE: EXAMPLE

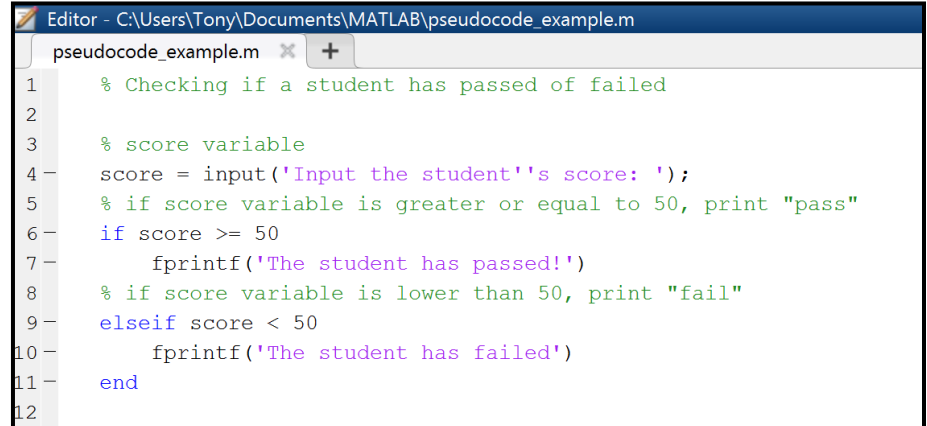
- Checking if a student has passed or failed
- Major pseudocode components:
 - Variables
 - Assignment
 - Input/output
 - Conditions
 - Repetition

% Checking if a student has passed or failed

% Initialise variables: score

% if score variable is greater or equal to 50, print "pass"

% if score variable is lower than 50, print "fail"



Editor - C:\Users\Tony\Documents\MATLAB\pseudocode_example.m

```
pseudocode_example.m x +
1 % Checking if a student has passed or failed
2
3 % score variable
4 score = input('Input the student's score: ');
5 % if score variable is greater or equal to 50, print "pass"
6 if score >= 50
7     fprintf('The student has passed!')
8 % if score variable is lower than 50, print "fail"
9 elseif score < 50
10     fprintf('The student has failed')
11 end
12
```

EXAMPLE PROBLEM

- Suppose you project that you will be able to deposit the following monthly amounts into a savings account, which pays 3% annual interest compounded monthly, for a period of 5 years. The account initially has no money in it.

Year	1	2	3	4	5
Monthly Deposit (\$)	300	350	400	450	500

- At the start of each year, you withdraw \$3000 to buy a certificate of deposit (CD), which pays 6% interest compounded annually.

EXAMPLE PROBLEM

- Write a MATLAB program to compute how much money you will have at the end of 5 years (total of savings account and CDs).
- Assumptions
 - *You will deposit money in the savings account on the 1st of the month*
 - *Savings account interest paid on the last day of the month*
 - *You withdraw money to buy CD on the 1st day of the year (from year 2 to year 5)*
 - *CD interest paid on the last day of the year.*

STEP 1: PSEUDOCODE

- As with any complicated problem, we can start by writing pseudocode
- Major pseudocode components:
 - Variables
 - Assignment
 - Input/output
 - Conditions
 - Repetition

```
% Initialise variables
% savings, CD, monthly deposit

% Savings account
% loop for years
% loop for months
% calculating interest for 12 months in 1 year
% deduct the CD

% CD account
% interest on CD account over years 2 to 5

% Adding savings and CD
```

STEP 2: PSEUDOCODE TO MATLAB CODE

Year	1	2	3	4	5
Monthly Deposit (\$)	300	350	400	450	500

```
% Initialise variables
% savings, CD, monthly deposit
savings = 0;
CD = 0;
deposit = [300 350 400 450 500];

% Savings account
% loop for years
% loop for months
% calculating interest for 12 months in 1 year (3/12 = 0.25)
% deduct the CD

% CD account
% interest on CD account over years 2 to 5

% Adding savings and CD
```

STEP 2: PSEUDOCODE TO MATLAB CODE

```
% Initialise variables
% savings, CD, monthly deposit
savings = 0;
CD = 0;
deposit = [300 350 400 450 500];

% Savings account
% loop for years
% loop for months
% calculating interest for 12 months in 1 year (3/12 = 0.25)
% deduct the CD
for year = 1:5 % for years 1 to 5

    % what happens inside each year????

end

% CD account
% interest on CD account over years 2 to 5

% Adding savings and CD
```


STEP 2: PSEUDOCODE TO MATLAB CODE

```
% Initialise variables
% savings, CD, monthly deposit
savings = 0;
CD = 0;
deposit = [300 350 400 450 500];

% Savings account
% loop for years
% loop for months
% calculating interest for 12 months in 1 year (3/12 = 0.25)
% deduct the CD
for year = 1:5 % for years 1 to 5
    for month = 1:12
        % what happens inside each month????
    end
end

% CD account
% interest on CD account over years 2 to 5

% Adding savings and CD
```

STEP 2: PSEUDOCODE TO MATLAB CODE

```
% Initialise variables
% savings, CD, monthly deposit
savings = 0;
CD = 0;
deposit = [300 350 400 450 500];

% Savings account
% loop for years
% loop for months
% calculating interest for 12 months in 1 year (3/12 = 0.25)
% deduct the CD
for year = 1:5 % for years 1 to 5
    for month = 1:12
        savings = (1.0025)*(savings+deposit(year)); % calculating interest for 12 months in 1 year
    end
    % how do we subtract the CD????
end

% CD account
% interest on CD account over years 2 to 5

% Adding savings and CD
```

STEP 2: PSEUDOCODE TO MATLAB CODE

```
% Initialise variables
% savings, CD, monthly deposit
savings = 0;
CD = 0;
deposit = [300 350 400 450 500];

% Savings account
% loop for years
% loop for months
% calculating interest for 12 months in 1 year (3/12 = 0.25)
% deduct the CD
for year = 1:5 % for years 1 to 5
    for month = 1:12
        savings = (1.0025)*(savings+deposit(year)); % calculating interest for 12 months in 1 year
    end
    savings = savings - 3000; % subtracting the CD
end

% CD account
% interest on CD account over years 2 to 5
    % next???

% Adding savings and CD
```

STEP 2: PSEUDOCODE TO MATLAB CODE

```
% Initialise variables
% savings, CD, monthly deposit
savings = 0;
CD = 0;
deposit = [300 350 400 450 500];

% Savings account
% comments cut
for year = 1:5 % for years 1 to 5
    for month = 1:12
        savings = (1.0025)*(savings+deposit(year)); % calculating interest for 12 months in 1 year
    end
    savings = savings - 3000; % subtracting the CD
end

% CD account
% interest on CD account over years 2 to 5
for k = 2:5 % from year 2 to year 5
    CD = CD + (1.06^(k-1))*3000;
end

% Adding savings and CD
% how do we add the savings and CD accounts?
```

STEP 2: PSEUDOCODE TO MATLAB CODE

```
% Initialise variables
% savings, CD, monthly deposit
savings = 0;
CD = 0;
deposit = [300 350 400 450 500];

% Savings account
% comments cut
for year = 1:5 % for years 1 to 5
    for month = 1:12
        savings = (1.0025)*(savings+deposit(year)); % calculating interest for 12 months in 1 year
    end
    savings = savings - 3000; % subtracting the CD
end

% CD account
% interest on CD account over years 2 to 5
for k = 2:5 % from year 2 to year 5
    CD = CD + (1.06^(k-1))*3000;
end

% Adding savings and CD
% adding the extra 3000 as at the end of year 5, no need to buy a CD
Total_savings = savings + CD + 3000;
```

STEP 3: VALIDATE YOUR CODE

- Run your code to ensure that there are no syntax errors
 - Address any errors that are encountered
- Justify your answers. Does it look correct?
 - Check against analytical answers if possible
 - Use different tools (e.g. plot) to validate your answer
 - If the numbers look incorrect, begin debugging your code

- Engineering problems are often too complicated to code on-the-fly
- Pseudocode allows you to plan your coding in a readable format
- Review your code as not all scenarios are thought out at the initial stage
- Is there a difference between comments and pseudocode?