MONASH University

MONASH
ENGINEERING
ENG1060

FPRINTF AND SPRINTF

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GROUP OF EIGHT AUSTRALIA

OUTPUTTING TO SCREEN

- We have previously learned how use disp()
  - The disp() function is very limited
  - Can only print one variable at a time
- What if you want to print multiple variables in one formatted line of text?
  - E.g. "A is 5, while B is 4 and C is 58.5"
  - E.g. "The maximum cost is $54 with a corresponding radius of 6.14"
- We can achieve this using the fprintf function

FPRINTF

- Syntax: fprintf('format', var1, var2, var3, …)

- First argument: is a string containing placeholders for your variables
  - Placeholders are denoted with a percentage symbol (%)
  - Placeholders are coupled with specifiers

- Subsequent arguments: are the variables for your placeholders
  - The list of variables appear in the order written

FPRINTF: EXAMPLE

- Syntax: fprintf('format', var1, var2, var3, …)

```
% Written by Tony Vo, ID: 12345678
% Date created 19/07/2015
%
% fprintf demo
clear all; close all; clc;

%getting the information from the user
opp_length = input('Enter the opposite length: ');
adj_length = input('Enter the adjacent length: ');
hyp_length = sqrt(opp_length^2 + adj_length^2);

%printing information
fprintf('The length of the hypotenuse is given by %f', hyp_length)
```

Command Window

```
Enter the opposite length: 3
Enter the adjacent length: 4
The length of the hypotenuse is given by 5.000000>>
```

FPRINTF: CONVERSION SPECIFIERS

- Conversion specifiers tell fprintf where and how variable values should be printed

```
%printing information
fprintf('The length of the hypotenuse is given by %f', hyp_length)
```

Specifier	Description	Examples (output in red)
%f	Fixed-point Notation	fprintf('%f',pi) 3.141593
%e	Exponential Notation	fprintf('%e',pi) 3.141593e+000
%d	Decimal Notation, no decimals if integer variable	fprintf('%d',2) 2
%g	Whichever is shorter, %f or %e	fprintf('%g',pi) 3.14159
%s	String of Characters	fprintf('%s', 'abc') abc

FPRINTF: MULTIPLE VARIABLES

- Order matters
  - Correct order:

```
%getting the information from the user
name = input('Enter your name: ', 's');
location = input('Enter your location: ', 's');
age = input('Enter your age: ');

%printing information
fprintf('My name is %s, aged %d from %s\n', name, age, location)
```

Command Window

```
Enter your name: Batman
Enter your location: Gotham City
Enter your age: 40
My name is Batman, aged 40, from Gotham City
```

  - Incorrect order:

```
…
%printing information
fprintf('My name is %s, aged %d from %s\n', location, age, name)
```

Command Window

```
Enter your name: Batman
Enter your location: Gotham City
Enter your age: 40
My name is Gotham City, aged 40, from Batman
```

FPRINTF: SPECIAL CHARACTERS

- fprintf allows printing of special characters
  - Better formatting and display of results

Special Character	What get's printed
\n	Newline
\t	Tab
\b	Backspace
‘‘ (2 single quotes)	Single Quote
%%	%

```
fprintf('My name is %s, aged %d from %s', location, age, name)
```

Command Window

```
Enter your name: Batman
Enter your location: Gotham City
Enter your age: 40
My name is Batman, aged 40, from Gotham City>>
```

```
fprintf('My name is %s, aged %d from %s\n', location, age, name)
```

Command Window

```
Enter your name: Batman
Enter your location: Gotham City
Enter your age: 40
My name is Batman, aged 40, from Gotham City
>>
```

SPECIAL CHARACTERS EXAMPLE

```
%demonstrating new line
fprintf('%f\n', pi)
```

Command Window

```
>> fprintf('%f\n', pi)
3.141593
>>
```

```
%demonstrating new lines
fprintf('%f\n\n\n', pi)
```

Command Window

```
>> fprintf('%f\n\n\n', pi)
3.141593


>>
```

Special Character	What get's printed
\n	Newline
\t	Tab
\b	Backspace
‘‘ (2 single quotes)	Single Quote
%%	%

```
%demonstrating backspace
fprintf('I''m %s\b\b\b\n', 'Batman')
```

Command Window

```
>> fprintf('I''m %s\b\b\b\n', 'Batman')
I'm Bat
>>
```

SPECIAL CHARACTERS EXAMPLE

%demonstrating % symbol
fprintf('Interest rate is %d%%\n', 6)

Command Window

```
>> fprintf('Interest rate is %d%%\n', 6)
Interest rate is 6%
>>
```

%demonstrating tabbed spacing
fprintf('Tabs\tlook\tlike\tthis\n')

Command Window

```
>> fprintf('Tabs\tlook\tlike\tthis\n')
Tabs    look    like    this
>>
```

%demonstrating double quotes
fprintf('''Some text in quotes''\n')

Command Window

```
>> fprintf('''Some text in quotes''\n')
'Some text in quotes'
>>
```

Special Character	What get's printed
\n	Newline
\t	Tab
\b	Backspace
‘‘ (2 single quotes)	Single Quote
%%	%

SPECIFYING WIDTH AND PRECISION

- Variables can also be printed with specified width and precision
  - Width = number of spaces used for printing
  - Precision = number of decimal places

    Syntax: %<width>.<precision><specifier>

- Try the following in MATLAB

```
fprintf('%f\n', pi)
fprintf('%.2f\n', pi)
fprintf('%20.2f\n', pi)
fprintf('%20.2e\n', pi)
```

FPRINTF WITH MATRICES

- fprintf works with vectors/matrices and prints each element
  - For a vector, printing starts with first element to last element
  - For 2D matrices, printing starts with each element in first column, then to next column, and so forth

```
% Written by Tony Vo, ID:12345678
% using fprintf with vectors and matrices
clear all; close all; clc;

%vector
x = [4 8 9 6 3 4]
fprintf('x is comprised of %.3f\n', x)

%matrix
y = [5 6 7 ; 15 51 32; 100 321 852]
fprintf('y is comprised of %.3f\n', y)
```

Command Window

```
x =

     4     8     9     6     3     4

x is comprised of 4.000
x is comprised of 8.000
x is comprised of 9.000
x is comprised of 6.000
x is comprised of 3.000
x is comprised of 4.000
```

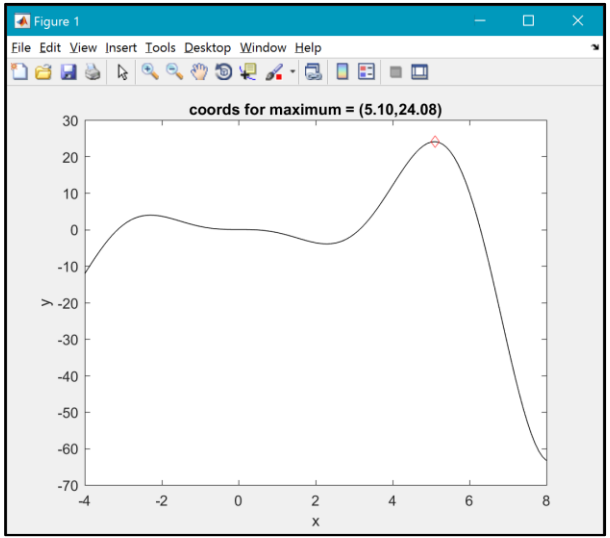
SPRINTF

- sprintf works the same as fprintf except that the resulting output is a string
  - This is useful for things like plot titles

```
%plotting variables
x = -4:0.1:8;
y = -sin(x).*x.^2;

%finding maximum
[max_y_coord, index] = max(y);
max_x_coord = x(index);

%plotting
plot(x,y,'k-',max_x_coord,max_y_coord,'rd')
title(sprintf('coords for maximum = (%.2f,%.2f)',max_x_coord,max_y_coord))
xlabel('x')
ylabel('y')
```



SUMMARY

- fprintf and sprint can print statements containing multiple variables
- There are different conversion specifiers
- Width and precision of the outputs can be specified

- Why can’t you use fprintf for the plot title?