MONASH
ENGINEERING
ENG1060

STRINGS AND ERRORS

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DATA TYPE: STRINGS

- MATLAB can provide many data types
  - So far, we have only used doubles

- A string is another data type
  - Strings are used to store characters
  - Also called "character strings" or "char array"

- Examples:

```
A = 'abcdef'
B = '1a2b3c'
C = '%^&*#^&%$'
```

DATA TYPE: STRINGS

- You would have used strings to label your plots
  - xlabel('string')
  - ylabel('string')
  - title('string')
  - legend('string')

CREATING STRINGS

- Use single quotes when creating strings

  My_name = 'Batman'

  ~~My_name = "Batman"~~

- Strings behave like vectors
  - My_name(2) contains the letter 'a'
  - My_name(1:3) contains the letters 'Bat'

- Strings can be concatenated like vectors

  ['I''m ' My_name(1:3)] → I'm Bat

  ['I''m ' My_name] → I'm Batman

STRINGS VS. NUMBERS

- Computers store characters using numbers called ASCII
  - ASCII stands for American Standard Code for Information Interchange
  - Numerical representation of a character such as 'a' or '@'
  - Computers only understand numbers
- If unsure, check the data type
  - Use the whos command or look through the workspace window
  - Char = character string
  - Double = numerical value

ASCII TABLE

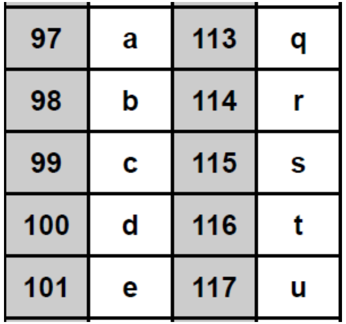
0	NUL	16	DLE	32	SP	48	0	64	@	80	P	96	`	112	p
1	SOH	17	DC1	33	!	49	1	65	A	81	Q	97	a	113	q
2	STX	18	DC2	34	"	50	2	66	B	82	R	98	b	114	r
3	ETX	19	DC3	35	#	51	3	67	C	83	S	99	c	115	s
4	EOT	20	DC4	36	$	52	4	68	D	84	T	100	d	116	t
5	ENQ	21	NAK	37	%	53	5	69	E	85	U	101	e	117	u
6	ACK	22	SYN	38	&	54	6	70	F	86	V	102	f	118	v
7	BEL	23	ETB	39	'	55	7	71	G	87	W	103	g	119	w
8	BS	24	CAN	40	(	56	8	72	H	88	X	104	h	120	x
9	HT	25	EM	41	)	57	9	73	I	89	Y	105	i	121	y
10	LF	26	SUB	42	*	58	:	74	J	90	Z	106	j	122	z
11	VT	27	ESC	43	+	59	;	75	K	91	[	107	k	123	{
12	FF	28	FS	44	,	60	<	76	L	92	\	108	l	124	|
13	CR	29	GS	45	-	61	=	77	M	93	]	109	m	125	}
14	SO	30	RS	46	.	62	>	78	N	94	^	110	n	126	~
15	SI	31	US	47	/	63	?	79	O	95	_	111	o	127	DEL

ASCII

- Do not mix strings and numbers
  - The ASCII values will be used in calculations, not the actual numbers
  - E.g. the value of '0' (string) is NOT ZERO (numeric)

- What is the result of the following commands?

```
my_text = 'abc';
result = my_text + 3
```



97	a	113	q
98	b	114	r
99	c	115	s
100	d	116	t
101	e	117	u

CONVERTING TO AND FROM STRINGS

- Built-in functions to convert between data types
  - char(): converts integers back to a character via ASCII codes
  - str2num(): converts a string to a number
  - num2str(): converts a number to a string

- Example:

```
my_text = 'abc';
result = my_text + 3
char(result) = ???
str2num('50 780 100') = ???
num2str(result) = ???
```

READING USER INPUT AS STRINGS

- Recall: The input() function can be used to get numbers from a user

```
a = input('Enter a number: ');
```

- How about reading in character strings?

```
a = input('Enter your name: ');
Enter your name: snow
Error using input. Undefined function or variable 'snow'
```

- You can accept character strings by adding a 's' argument when calling input()

```
a_str = input('Enter your name: ', 's');
```

ERRORS ARE IMPORTANT

- Don't ignore error messages
- Syntax error:

```
Error: Expression or statement is incorrect – possibly unbalanced (, {, or [.
Error using ==> mtimes. Inner matrix dimensions must agree.
Error: Function definitions are not permitted in this context
```

ERRORS ARE IMPORTANT

- Run-time error:

```
Undefined function or variable 'g'.
Undefined function or variable 'sine'
Error: Function definitions are not permitted in this context
```

- Logic error:
  - Your code order execution is incorrect
- Human error
  - E.g. Inputting incorrect numbers and equations

SUMMARY

- Strings are a character data type
- Strings have a numerical value corresponding to ASCII
- Converting to and from strings
- Errors are important, do not ignore!

- Is it possible for a vector to contain both strings and numbers?