

## Conditional Statements :

Problem: 
$$f(x) = \begin{cases} x, & x < 0 \\ x \sin(x), & 0 \leq x \leq 2\pi \\ 3, & x > 2\pi \end{cases}$$

Build a function in MATLAB called `myfunc(x)` which takes in  $x$  and returns  $f(x)$

## For/While loop:

The double factorial  $n!!$  is given by

$(n!)! \neq n!!$

$$n!! = \begin{cases} n(n-2)(n-4) \dots (4)(2) & n \text{ even} \\ n(n-2)(n-4) \dots (3)(1) & n \text{ odd} \end{cases}$$

`doublefact(n)` takes in  $n$   
and returns  $n!!$

## Nested for/while loops :

Make a function called `transp(A)` which takes in a matrix  $A$  and returns the transpose of  $A$ .

Remember: the transpose of an  $m \times n$  matrix  $A$  is an  $n \times m$  matrix  $B$  with  
 $B(j,k) = A(k,j)$

Ex:

$$A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \\ 7 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 & 7 \\ 3 & 1 & 0 \end{bmatrix}$$

## Complex numbers

Ex:  $z = 3 + 5i$

$$\operatorname{Re}(z) = 3$$

$$\operatorname{Im}(z) = 5$$

$$(\operatorname{Im}(z) \neq 5i)$$

TRUE OR FALSE:

(a) 3 is a complex number T  $3 = 3 + 0i$

(b)  $2 + 7i$  is an imaginary number F

(c)  $3 + 4i$  is a real number F

Ex:  $(2 + 7i)(3 + 4i) = -22 + 29i$

$$= 2 \cdot 3 + 7i \cdot 3 + 2 \cdot 4i + (7i)(4i)$$

$$= 6 + 21i + 8i + 28i^2 \quad i^2 = -1$$

$$= 6 - 28 + 29i = -22 + 29i$$

Ex:  $\frac{2 + 3i}{1 - i} = -\frac{1}{2} + \frac{5}{2}i$

$$\swarrow \frac{2 + 3i}{1 - i} \cdot \frac{1 + i}{1 + i} = \frac{(2 + 3i)(1 + i)}{(1 - i)(1 + i)} = \frac{2 + 3i + 2i + 3i^2}{1 + 1}$$

$$= \frac{-1 + 5i}{2} = -\frac{1}{2} + \frac{5}{2}i$$

Ex:  $|1 + 2i| = \sqrt{1^2 + 2^2} = \sqrt{5}$

TRUE OR FALSE :

$$z = a + ib$$

$$\bar{z} = a - ib$$

a)  $z$  is real iff  $z = \bar{z}$

T

b)  $z\bar{z} = |z|$

F

$$z\bar{z} = |z|^2$$

$$(a+ib)(a-ib) = a^2 + i\cancel{ab} - i\cancel{ab} - b^2 i^2 \\ = a^2 + b^2$$







