# Solution to the exercises of Session 2 <small>Version 1.0.1</small>

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- **Section 1.3 / 1**

|  | uint8 | int8 | uint16 | int16 | uint32 | int32 |
|---|---|---|---|---|---|---|
| int min | 0 | -128 | 0 | -32768 | 0 | -2147483648 |
| int max | 255 | 127 | 65535 | 32767 | 4294967295 | 2147483647 |

| uint64 | int64 |
|---|---|
| 0 | -9223372036854775808 |
| 18446744073709551615 | 9223372036854775807 |

- **Section 1.3 / 2**

```
>> a = uint8( 150 );
>> b = uint8( 130 );
>> c = a + b

ans =
    255    (standard MATLAB)

??? Error using ==> uint8.plus at 15
Result out of range.    (our MATLAB installation)
```

- **Section 1.3 / 3**

```
>> a = int8( -120 );
>> b = uint8( 100 );
>> c = a + b

??? Error using ==> plus Integers can only be combined with integers
of the same class, or scalar doubles.    (standard MATLAB)

ans =
    -20    (our MATLAB installation)
```

- **Section 1.4.1 / 1**

|  | single | double |
|---|---|---|
| eps( 1 ) | 1.1921e-07 | 2.2204e-16 |

- **Section 1.4.1 / 2**

```
>> 1 - 3*(4/3 - 1)

ans =
    2.2204e-16
```

- **Section 1.4.1 / 3**

|          | single      | double       |
|----------|-------------|--------------|
| real min | 1.1755e-38  | 2.2251e-308  |
| real max | 3.4028e+38  | 1.7977e+308  |

- **Section 1.4.3**

```
>> a = 1 / 0

a =
    Inf

>> b = -1 / 0

b =
    -Inf

>> c = 0 / 0

c =
    NaN
```

- **Section 2.1.2**

```
>> a = [ 1 2 3 ];
>> b = [ 1; 2; 3 ];
>> a + b

??? Error using ==> plus
Matrix dimensions must agree.

>> a .* b

??? Error using ==> times
Matrix dimensions must agree.

>> a * b

ans =
    14    (scalar product, inner product)

>> b * a

ans =
    1    2    3
    2    4    6
    3    6    9    (matrix multiplication, outer product)
```

- **Section 2.1.3**

```
>> a = 7:3

ans =
    Empty matrix: 1-by-0
```

- **Section 2.1.4**

```
>> a = 2 : 2 : 20;
>> a( 1 : 3 : length( a ) )

ans =
     2     8    14    20
```

- **Section 2.1.6 / 1**

The sampling is way too low. The curve barely looks like the sine function it approximates.

- **Section 2.1.6 / 2**

```
>> xlabel( 'x' );
>> ylabel( 'sin( 3 * pi * x )' );
>> title( 'Plot of sin( 3 * pi * x ) versus x' )
```

- **Section 2.1.7 / 1**

```
>> a = 1 : 100;
>> a( find( mod( a, 2 ) == 0 ) ) = 0;
```

Simpler:

```
>> a( mod( a, 2 ) == 0 ) = 0;
```

- **Section 2.1.7 / 2**

```
a( mod( a, 2 ) == 0 & mod( a, 3 ) == 0 & mod( a, 4 ) ~= 0 )
```

- **Section 2.2 / 1**

```
>> v = 1 : 50;
>> M = [ v; 50 + v; 100 + v ];
```

- **Section 2.2 / 2**

```
>> M = 25 + 5 * rand( 1000, 1000 );
```

- **Section 2.2.3**

Write this as a script *performance.m* and run it from the MATLAB console:

3

```
A = rand( 10000, 10000 );
B = rand( 10000, 10000 );
tic; C = A + B; toc;
tic;
C = zeros( size( A ) );
for i = 1 : size( A, 1 )
  for j = 1 : size( A, 2 )
    C( i, j ) = A( i, j ) + B( i, j );
   end
end
toc
Elapsed time is 0.231289 seconds.
Elapsed time is 5.269698 seconds.
```

- **Section 3.2**

```
>> weather(1:3)=struct('temp',72,'rainfall',0.0);

>> weather=repmat(struct('temp',2,'rainfall',0.0),1,3)

>> weather=struct('temp',{68,80,72},'rainfall',{ 0.2,0.4,0.0})

weather =
1x3 struct array with fields:
    temp
    rainfall    (shown only once)
```

- **Section 5**

```
>> s = fminsearch( @(x) sin( x ) + cos( x ), 5 )

s =
    3.9270
```