

Department of Electrical & Electronic Engineering

Imperial College London

Solution to ISE1/EE2 Computing Lab Exercise: Learning MATLAB

```
% Model answer to Lab Session 1
% Exercise 2 - file: lab1_1.m
%
% Problem: Create and plot a sinewave at 1kHz sampled at 44.1kHz
%           with an amplitude of 1.0V
```

```
% define sampling frequency
fs = 44100;
```

```
% define signal frequency
f = 1000;
```

```
% calculate angular increment per sample
delta_angle = 2*pi*f/fs;
```

```
% create angle vector for 4 cycles
t = 0:delta_angle:4*(2*pi);
```

```
% create sine wave
sinewave = sin(t);
```

```
% plot it
plot(t,sinewave);
grid
```

```
% scale axis for suitable max and min values
axis([0 8*pi -1 1]);
```

```
% label axes
xlabel('0 \leq \itangle \leq \pi');
ylabel('Amplitude');
title('Sinewave at 1kHz');
```

```
function [t, sinewave] = sinegen(fsig, fsamp, ncycle)
% Sinewave Generation
% fsig = signal frequency
% fsamp = sampling frequency
% ncycle = number of cycles to generate
%
% This is part of EE2 Computing Lab Session 1, Exercise 2
%
% Peter Cheung
% 15th October 1998.
% $Revision: 1.0 $
```

```
% calculate angular increment per sample
delta_angle = 2*pi*fsig/fsamp;
```

```
% create angle vector for 4 cycles
```

```
t = 0:delta_angle:4*(2*pi);
```

```
% create sine wave
sinewave = sin(t);
```

```
function [noise] = noisegen(rms, nsamp)
% Noise Generation
% fsamp = sampling frequency
% nsamp = number of samples
%
% This is part of EE2 Computing Lab Session 1, Exercise 2
%
% Peter Cheung
% 15th October 1998.
% $Revision: 1.0 $
```

```
noise = rms*randn(nsamp);
```

```
% Model answer to Lab Session 1
% Exercise 2 - file: lab1_2.m
%
% Problem: Create and plot a sinewave at 1kHz sampled at 44.1kHz
%           with an amplitude of 1.0V using the sinegen()
function
```

```
% define sampling frequency
fs = 44100;
```

```
% define signal frequency
f = 1000;
```

```
% create sine wave
[t,sinewave]=sinegen(f,fs,4);
```

```
% plot it
plot(t,sinewave);
grid
```

```
% scale axis for suitable max and min values
axis([0 8*pi -1 1]);
```

```
% label axes
xlabel('0 \leq \itangle \leq \pi');
ylabel('Amplitude');
title('Sinewave at 1kHz');
```