

Matlab Exercises 1: Solutions

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Questions

1. Construction is as it appears in the notes, i.e.

```
>> x = [1 2 3 4 5];  
>> y = [6 7 8 9 10]';  
>> u = [0:8];  
>> v = [0:2:8];  
>> z=[x y']  
>> A=[1 2; 3 4;]  
>> B=[4 5; 6 7; 8 9;]  
>> C=[x(1:3) ; y(3:5)']
```

2. No solution needed.

3. No solution needed.

4. No solution needed.

5. `all(all(D == E))`

6. `[0 0.0050 0.0000 0.5000 0.0000]`

7. a) Most simply use: `([1:6].^2).*sin([1:6].^2)`, but a better solution is probably `arrayfun(@(x)(x^2*sin(x^2)), [1:6])`

b) For general vector `vec`, do `sign(vec).*ceil(abs(vec))`

8. `M = diag([1:5],1) + diag([10:-1:6],-1)`

b) `[vecs, vals] = eig(M)`

9. The numbers are 376 , 625.

You could use:

```
find([ ([1:9] == ([1:9].^2-floor([1:9].^2/10)*10)) ...  
      ([10:99] == ([10:99].^2-floor([10:99].^2/100)*100)) ...  
      ([100:999] == ([100:999].^2-floor([100:999].^2/1000)*1000)) ])
```

10. Something like the following:

```
x = linspace(0,5,51);
y = sin(x);
y2 = x - x.^3/factorial(3) + x.^5/factorial(5);
plot(x,y,x,y2)
plot(x,y,'b',x,y2,'go')
xlabel('x')
ylabel('y')
title('Graph of sine wave and 5 order approximation')
legend('sin(x)', '5th order approx. of sin(x)')
```

11. Something like the following, followed by decoration.

```
t = linspace(0,2*pi,51);
x = t.*sin(2*t);
y = cos(t);
plot(x,y)
```

For the spiral, something like this should do:

```
t = linspace(0,6*pi);
x = t.*sin(t);
y = t.*cos(t);
plot(x,y)
```

12. The surface is $z = \text{sinc}(\sqrt{x^2 + y^2})$. They will need to create a mesh then run the surf command. Something like

```
x = linspace(-5,5,101);
y = sinc(x);
plot(x,y)
[x2,y2] = meshgrid(x,x);
z = sinc(sqrt(x2.^2 + y2.^2));
surf(x,y,z)
```