1. Execute the following commands:

```matlab
>> t = 0:0.5:4;
>> y1 = cos(2*pi*t);
>> y2 = cos(4*pi*t);
>> plot(t,y1);
>> hold on;
>> plot(t,y2);
```

Explain why you see twice the same plot.

**answer:** It appears as if we see only one plot, but actually, the range for t is so wide that \( \cos(4 \pi t) \) always evaluates to one, because \( t = 0, 0.5, 1, 1.5, \ldots \) which makes that \( 4 \pi = 0, 2\pi, 4\pi, 6\pi, \ldots \), thus always a multiple of \( 2\pi \). On this range, \( \cos(2\pi t) \) evaluates to +1 or -1. So the values in \( y1 \) alternate, while the values in \( y2 \) are constant.

2. Define a matrix which permutes the elements in a cyclic way, for example

```matlab
>> a = [0 0 0 1; 1 0 0 0; 0 1 0 0; 0 0 1 0]
>> a*[1 2 3 4]'
```

shifts first to second, second to third, third to fourth, and fourth to first.

Give the MATLAB commands (using `sparse`) to define such a permutation matrix of size 10, to permute \([1 2 3 4 5 6 7 8 9 10]\) into \([10 1 2 3 4 5 6 7 8 9]\).

**answer:**

```matlab
>> rows = [1:10]; cols = [10 1:9];
>> b = sparse(rows,cols,ones(1,10));
>> b*[1:10]'
```

**Alternative:** On Monday 4/28, give the answers to 7.4.1,2 and 8.4.1,4,5.