

NAME : ANSWERS

1. Execute the following commands:

```
>> 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 $t = 0, 0.5, 1, 1.5, \dots$ which makes that $4\pi t = 0, 2\pi, 4\pi, 6\pi, \dots$, thus always a multiple of 2π . 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

```
>> 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:

```
>> 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.