

Quick Questions

1. (10 points) The `demoPrint` function listed below is designed to print a table of strings and numbers. The listing below shows the function with only one missing piece: the format string for the `fprintf` statement inside the loop. Write the missing format string so that the `demoPrint` function produces the output in the sample sessions printed below the code listing. Note that there are multiple solutions to the problem.

Note that the `%e` format produces two different outputs depending on the platform. For windows computers the exponent is printed with three digits for the exponent. For unix computers (e.g. linux and Macintosh), the exponent is printed with two digits for the exponent. The difference in exponent format is not important. Use whichever computer platform you have available.

The source code, with the missing format string, is available on the web site for the course. The strings of digits above and below the table are to help you identify the location of the columns created by the format string.

```
function demoPrint

names = strvcat('Leah H. Jamieson','Guido van Rossum','Patti Smith',...
               'Ephraim Sparrow','Grace Hopper','Gene Golub');
s = logspace(-4,1,6); t = log(s); u = log10(s);
c = repmat('1234567890',1,6);
fprintf('\n%s\n',c);
for i=1:size(names,1)
    fprintf( 'FORMAT STRING GOES HERE \n',names(i,:),s(i),t(i),u(i));
end
fprintf('%s\n\n',c);
```

Output from MATLAB running on linux and Macintosh computers:

```
>> demoPrint

1234567890123456789012345678901234567890123456789012345678901234567890
Leah H. Jamieson : 1.000e-04 -9.21 -4
Guido van Rossum : 1.000e-03 -6.91 -3
Patti Smith : 1.000e-02 -4.61 -2
Ephraim Sparrow : 1.000e-01 -2.30 -1
Grace Hopper : 1.000e+00 0.00 0
Gene Golub : 1.000e+01 2.30 1
1234567890123456789012345678901234567890123456789012345678901234567890
```

Output from MATLAB running on Windows computers:

```
>> demoPrint

1234567890123456789012345678901234567890123456789012345678901234567890
Leah H. Jamieson : 1.000e-004 -9.21 -4
Guido van Rossum : 1.000e-003 -6.91 -3
Patti Smith : 1.000e-002 -4.61 -2
Ephraim Sparrow : 1.000e-001 -2.30 -1
Grace Hopper : 1.000e+000 0.00 0
Gene Golub : 1.000e+001 2.30 1
1234567890123456789012345678901234567890123456789012345678901234567890
```

Either of the two formats are acceptable.

Comprehensive Questions

2. **(10 points)** Textbook problem 5.14.
3. **(10 points)** Textbook problem 5.15.
4. **(20 points)** Using one of m-files discussed during Lecture 4 as a starting point, write an m-file function to evaluate the series approximation to the $\sin(x)$. The function definition should be

```
function [s,n] = nTermSine(x,tol,maxterms)
```

where `tol` is the tolerance used in the stopping criterion and `maxterms` is the upper limit on the number of terms allowed in the series approximation.

- (a) Does your function use an absolute or relative convergence tolerance?
- (b) Make a plot of the absolute error, relative error, and number of terms used in the series for $\pi \leq x \leq 2\pi$. Use the `subplot(3,1,k)` command to stack these three plots on top of each other, where `k` is an index to one of the subplots. Comment on the trends in the plot.
- (c) Does the convergence criteria work for all x in the range $\pi \leq x \leq 2\pi$?