

STAPLE your homework. MARK your homework clearly with your NAME. In addition, write the first letter of your LAST NAME boldly into the upper left corner of the first page of your homework . For this to be of real help, the vertical edge of the upper left corner should be longer than the horizontal edge.

1. (25 points) Assume that x , y , and z are MATLAB arrays initialized as follows:

```
x = linspace(0,2*pi); y = cos(x); z = exp(-x);
```

Write a MATLAB fragment that plots the function $e^{-x} \cos(x)$ across the interval $[0 \dots 4\pi]$. The fragment should not involve any additional calls to `cos` or `exp`. (Hint: employ the fact that `cos` has period 2π and that the exponential satisfies $e^{a+b} = e^a e^b$.)

Hand in a printout of your script along with a printout of the figure generated.

2. (30 points) Write a MATLAB script that uses Monte Carlo, as described in Section 1.3.2, to estimate the area of the set S of all points in the unit square

$$[-1 \dots 1]^2 := \{x \in \mathbb{R}^2 : |x_1|, |x_2| \leq 1\}$$

that are closer to the point $(.21, .39)$ than to any edge of that square.

Hand in a printout of your script along with a printout of the diary showing the output from a run of your script that uses 2,500 random points in the square.

3. (10 points) Assume that y and z are normalized floating-point numbers in a base-2 computer with a t -bit mantissa. How small can $z - y$ be if $y < 16 < z$?

4. (2*5 points) For each of the following, state whether it is true or false, and give a brief reason (or evidence) for your answer.

1. In Matlab, one can plot several curves with one `plot` command.
2. If `size(x)` equals `[3,1]`, then the statement `x(4)`; causes an error return.
3. If `size(x)` equals `[3,1]`, then the statement `x(4)=4`; causes an error return.
4. There is no way to get rid of the enclosing box with those axes markings that Matlab's `plot` command provides (and that all the figures in Chapter 1 of the textbook show).
5. If $k > 2$, and the k th term, x_k , in an updown sequence is a local maximum (i.e., bigger than x_{k-1} and x_{k+1}), then x_{k-1} is a local minimum.