

MATH 1180
MATHEMATICS FOR LIFE SCIENTISTS
Computer Assignment VII
Due March 2, 2004

PROBLEMS

Warm up Maple for today's problems with the commands

```
> iread(histplot);  
> iread(draw);  
> with(stats);  
> iread(iter);
```

- **1.** Suppose that the p.d.f. for the time X a molecule leaves a cell is equal to

$$f(x) = 2.5e^{-2.5x}$$

for $x \geq 0$.

- a. Use integration to compute the c.d.f. $F(x)$.
 - b. Plot f and F on one graph for $0 \leq x \leq 2$.
 - c. Compute the probability that the time lies between 1 and 1.5 and mark the associated area on your graph of f .
 - d. Compute the probability that the time is less than 0.6 and indicate this on your graphs of f and F .
 - e. Find the median.
 - f. Use integration to find the expectation. Does it match the median?
- **2.** The updating function for the position of a molecule is given by

```
> h := x -> bern(0.7)*x+bern(0.3)*(1-x);
```

where $x = 1$ represents inside and $x = 0$ outside. To get the random number generator to produce the same sequence of numbers more than once, set its “seed” with the command

```
> _seed := 5;
```

(or use any other positive integral value instead of 5). Set “_seed” to your chosen value and use “iterplot” to plot a solution of length 50 starting at $x = 1$. Reset “_seed” to your chosen value and use the command “iterprint” as follows to see the numbers

```
> iterprint(h,50,1);
```

Based on your data, compute $\Pr(x_{t+1} = 1)$, $\Pr(x_{t+1} = 1|x_t = 1)$ and $\Pr(x_{t+1} = 1|x_t = 0)$. Compare these results with what you would expect based on the updating function.