2.1 The following code can be used to estimate the probability of throwing a four, from 100 simulations,

```
w = rand(100,1);
prob4 = sum(w<=0.25)/100;
```

2.2 This code can be used to estimate the probability of drawing a red ball, followed by a green ball, from 100 simulations.

```
count=0;
for i=1:100
  bag = [ 1 1 1 2 2 2 ]; % 1=red ball, 2=green ball
  perm = randperm(6);    % random ordering of numbers 1 to 6
  balls = bag(perm);     % random ordering of balls in the bag

  if (balls(1)==1 && balls(2)==2)
     count = count+1;
  end
end

prob_R_G = count/100;
```

This answer can be calculated analytically as follows:

$$p(red, green) = \frac{4!/2!2!}{6!/3!3!} = 0.3$$

The denominator is the number of ways of distinct ways arranging the balls. The numberator is the number of ways of distrinct ways arranging the balls, with the first ball fixed as red and the second fixed as green.

3 1.

$$p(2H, 2T) = \frac{4!/2!2!}{2^4} = 0.375$$

2.

$$p(win) = \frac{1}{\binom{10}{5}} = \frac{1}{252}$$

3. For each pair of throws, there $4 \times 4 = 16$ ways of throwing the dice, and 15 ways of NOT throwing a double four. Therefore:

$$
\begin{aligned}
p(\text{not}\,4) &= \left(\frac{15}{16}\right)^3 \\
p(4) &= 1 - \left(\frac{15}{16}\right)^3 \approx 0.176
\end{aligned}
$$