### 7.1 The Binomial Distribution \& Hypothesis Testing (Homework)

## Question 1

S2 Examination Question from Tuesday 21st January 2008, Q1
( a ) Explain what you understand by a census

Each cooker produced at GT Engineering is stamped with a unique serial number. GT EWngineering produces cookers in batches of 2000.
Before selling them, they test a random sample of 5 to see what electrical current overload they will take before breaking down
(b) Give one reason, other than to save time and cost, why a sample is taken rather than a census.
[ 1 mark ]
( c) Suggest a suitable sampling frame from which to obtain this sample.
[ 1 mark ]
(d) Identify the sampling units.

## Question 2

S2 Examination Question from Tuesday 21st January 2008, Q2
The probability of a bolt being faulty is 0.3
Find the probability that in a random sample of 20 bolts there are
( a ) exactly 2 faulty bolts
(b) more than 3 faulty bolts

These bolts are sold in bags of 20.
John buys 10 bags.
(c) Find the probability that exactly 6 of these bags contain more than 3 faulty bolts.

## Question 3

S2 Examination Question from Tuesday 21 st January 2008, Q5
Dhriti grows tomatoes. Over a period of time, she has found that there is a probability 0.3 of a ripe tomato having a diameter greater than 4 cm .
She decides to try a new fertiliser.
In a random sample of 40 ripe tomatoes, 18 have a diameter greater than 4 cm .
Dhriti claims that the new fertiliser has increased the probability of a ripe tomato being greater than 4 cm in diameter.

Test Dhriti's claim at the 5\% level of significance.
State your hypotheses clearly.

## Question 4

S2 Examination Question from Friday 18th January 2013, Q3
A random variable $X$ has the distribution $\mathrm{B}(12, p)$
( a ) Given that $p=0.25$, find
(i) $\mathrm{P}(X<5)$
(ii) $\mathrm{P}(X \geqslant 7)$
[ 3 marks ]
(b) Given that $\mathrm{P}(X=0)=0.05$, find the value of $p$ to 3 decimal places

## Question 5

S2 Examination Question from Tuesday 17th January 2012, Q2
David claims that the weather forecasts produced by local radio are no better that those achieved by tossing a fair coin and predicting rain if a heads is obtained or no rain if a tail is obtained.
He records the weather for 30 randomly selected days.
The local radio forecast is correct on 21 of these days.

Test David's claim at the 5\% level of significance.
State your hypotheses clearly.

