

# Continuous Distribution - Normal- Exam Questions

## 1 Approximations

### 1.1 Poisson

#### 1.1.1 Cases where normal can be used to approximate poisson

- $\lambda > 10$

#### 1.1.2 Conversion

$$X \sim P_o(\lambda)$$

$$X \sim N(\lambda, \lambda)$$

#### 1.1.3 Continuity correction

As the poisson distribution is discrete and the normal distribution is continuous continuity correction must be used.

Probability	Corrected Probability
$P(X = n)$	$P(n - 0.5 < X < n + 0.5)$
$P(X > n)$	$P(X > n + 0.5)$
$P(X \leq n)$	$P(X < n + 0.5)$
$P(X < n)$	$P(X < n - 0.5)$
$P(X \geq n)$	$P(X > n - 0.5)$

#### 1.1.4 Example question

*During the summer the mean number of yachts hired per week is 25.*

*The company has only 30 yachts for hire.*

*Using a suitable approximation find the probability that the demand for yachts cannot be met on a particular Saturday in the summer.*

Let X Represent the number of yachts hired

$$X \sim P_o(25)$$

$$X \sim N(25, 25)$$

Write inequality

$$P(X > 30)$$

Apply continuity correction

$$P(X > 30.5)$$

Do Z transformation

$$Z = \frac{30.5 - 25}{5} = 1.1$$

Lookup value in tables

$$0.8643$$

Subtract from one as probability is greater than

$$1 - 0.8643 = 0.1357$$

## 1.2 Binomial

### 1.2.1 Conditions for normal to approximate binomial

- $n > 10$
- $p < 0.5$