Normal Distribution

Checklist

Use this space to keep track of your progress with this subtopic. Print and file this document together with those from different sub-topics in a file for quick reference.

| Task	Complete (tick or cross)	Traffic Light (Red, amber or green)
Watch the video tutorials		
Check you know your calculators skills		
Review the slides		
Review/annotate the flashcards		
Complete the quiz		
Complete the exam style questions		
Check your solutions against the solution videos		
Review any remaining areas you need to.		

Flashcards

The Normal Distribution

Flashcard

Symmetrical properties of the normal distribution
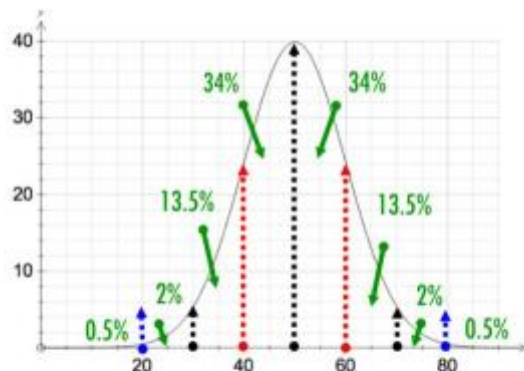
68% of results are within +/- 1 Standard deviation of the mean

95% of results are within +/- 2 Standard deviation of the mean

99% of results are within +/- 3 Standard deviation of the mean

The Normal Distribution
Flashcard 2

Normal CDF

Mean	This is the mean average for the data set
Standard Deviation	This is the standard deviation for the data set
Lower Limit	This is either given OR 0
Upper Limit	This is either given OR 10^{99} (or a similarly very large number)

```
Normal  C.D
Data      :Variable
Lower     :60
Upper     :1E+99
σ         :10
μ         :50
```

Standard deviation = 10

Between 60 (lower limit)

And 10^{99} (upper limit)

Mean = 50

TI

$$Normalcdf(L, U, \mu, \sigma)$$

Distr (2nd Vars)

Normal CDF

The Normal Distribution
Flashcard 3   Inverse Normal

2.5% of results below which score?

```
Inverse  Normal
Data      :Variable
Tail      :Left
Area      :0.025
σ         :10
μ         :50
Save Res  :None
 List  Var
```

Standard deviation = 10

Mean = 50

2.5 % (p = 0.025) of results are **BELOW** this score

```
Inverse  Normal
  xInv=30.4003602
```

2.5% of results (p = 0.025) were **BELOW** (to the left of) a score of **30.4**

Probability/Area   Mean   Standard deviation

```
▲rm(.025,50,10)
invNorm(.025,50▶
        30.40036014
```

NOTE - this is slightly more accurate than the estimation of 30 you would get using the symmetrical approximations
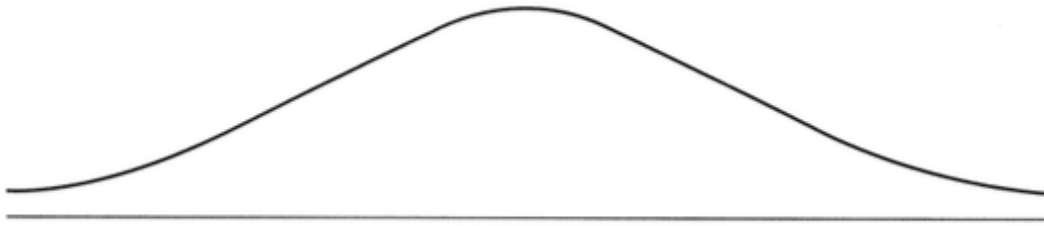
Exam Style Questions

Complete these questions on paper and then check your solutions against the video solutions on the website.

Question 1

The weights of Grizzly bears are normally distributed with a mean of 357 kg and a standard deviation of 21 kg.

(a) Show this information on the diagram below.

Using the diagram

(b) Write down the probability that a randomly selected bear is greater than 357 kg.

(c) Write down the probability that a randomly selected bear is less than 315 kg.

(d) The probability that a particular bear is less than x kg is 0.84, find the value of x.

Working......

(b) _____

(c) _____

(d) _____

(6 marks)

Question 2

The sizes of adult tuna fish are normally distributed with a mean of 22 kg and a standard deviation of 3 kg.

(a) Calculate the probability that a randomly selected tunafish is less than 17 kg.

(b)   (i) Calculate the probability that a randomly selected tunafish is between 20 and 24kg

        (ii) The probability of a tunafish being more than x kg is 0.1, calculate the value of x.

Working……

(a) _____

(b) (i)_____

     (ii)_____

(6 marks)

Question 3

The weights of newborn babies are normally distributed with a mean of about 3.4kg and a standard deviation of 0.9kg. Newborn babies' weights are classified as extremely low, low, normal, and high as shown in the table below.

Size	Weight (kg)
Extremely Low	Weight < 1
Low	1 ≤ Weight < 2.5
Normal	2.5 ≤ Weight < 4.2
High	Weight ≥ 4.2

(a)   Draw a diagram and shade the region representing the probability that a baby chosen at random, has a low birth weight.

(b)   (i) Find the probability that a newly born baby, chosen at random, is born with a high birth weight.

(ii) If there are 5.4 million births in the European union each year, approximately how many are born with a high birth weight?

(iii) Write your answer from part (ii) in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in \mathbb{Z}$.

(c)   There is a 0.7 probability that a baby is born with a weight greater than w kg.

(i)   Find w.

(10 marks)