

UNIT 9 *Data Analysis*

Overhead Slides

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OS 9.1

Mean, Median and Mode

DATA Estimates for drawing a line of length 10 cm are:
8, 9, 7, 11, 10, 9, 9, 8, 10 cm

MEAN

$$\frac{\text{Sum of lengths}}{\text{Total number of values}} = \underline{\hspace{2cm}}$$

$$\text{Mean} =$$

MEDIAN Lengths in ascending order are:

The median is the middle value, so

$$\text{Median} =$$

MODE This is the length with most frequency, so

$$\text{Mode} =$$

OS 9.2

Mean Value from Frequency Table

A football team's record of goals scored is given in the table.
Find the mean number of goals scored per match.

<i>No. of goals</i>	<i>Frequency</i>	<i>No. of goals × Frequency</i>
0	4	
1	7	
2	8	
3	5	
4	2	
5	3	
6	1	
TOTALS		
	<i>Total matches</i>	<i>Total goals</i>

$$\begin{aligned}
 \text{Mean} &= \frac{\text{Total goals}}{\text{Total number of matches}} = \frac{\quad}{\quad} \\
 &= \quad
 \end{aligned}$$

OS 9.3

Estimation of Mean

The table shows the populations of different age groups in the UK for 1961 and 1991.

<i>Age (x)</i> <i>(in years)</i>	<i>% of Population</i>		<i>Mid-point</i>	<i>Mid-point × Population</i>	
	<i>1961</i>	<i>1991</i>		<i>1961</i>	<i>1991</i>
$0 \leq x < 16$	13.1	11.7			
$16 \leq x < 40$	16.6	20.6			
$40 \leq x < 66$	16.9	16.5			
$66 \leq x < 80$	5.2	7.0			
$80 \leq x < 100$	1.0	2.2			
TOTALS	52.8	58.0			

$$\text{Estimate of Mean for 1961} = \frac{\quad}{52.8} =$$

$$\text{Estimate of Mean for 1991} = \frac{\quad}{58.0} =$$

How has the population changed from 1961 to 1991?

OS 9.4 Sheet 1*Cumulative Frequency*

The table shows the age distribution (in complete years) of the population of Nigeria in 1991.

Age	$0 \leq x < 15$	$15 \leq x < 30$	$30 \leq x < 45$	$45 \leq x < 60$	$60 \leq x < 75$	$75 \leq x < 100$
% of Pop.	32	29	20	12	6	1
Cumulative %						

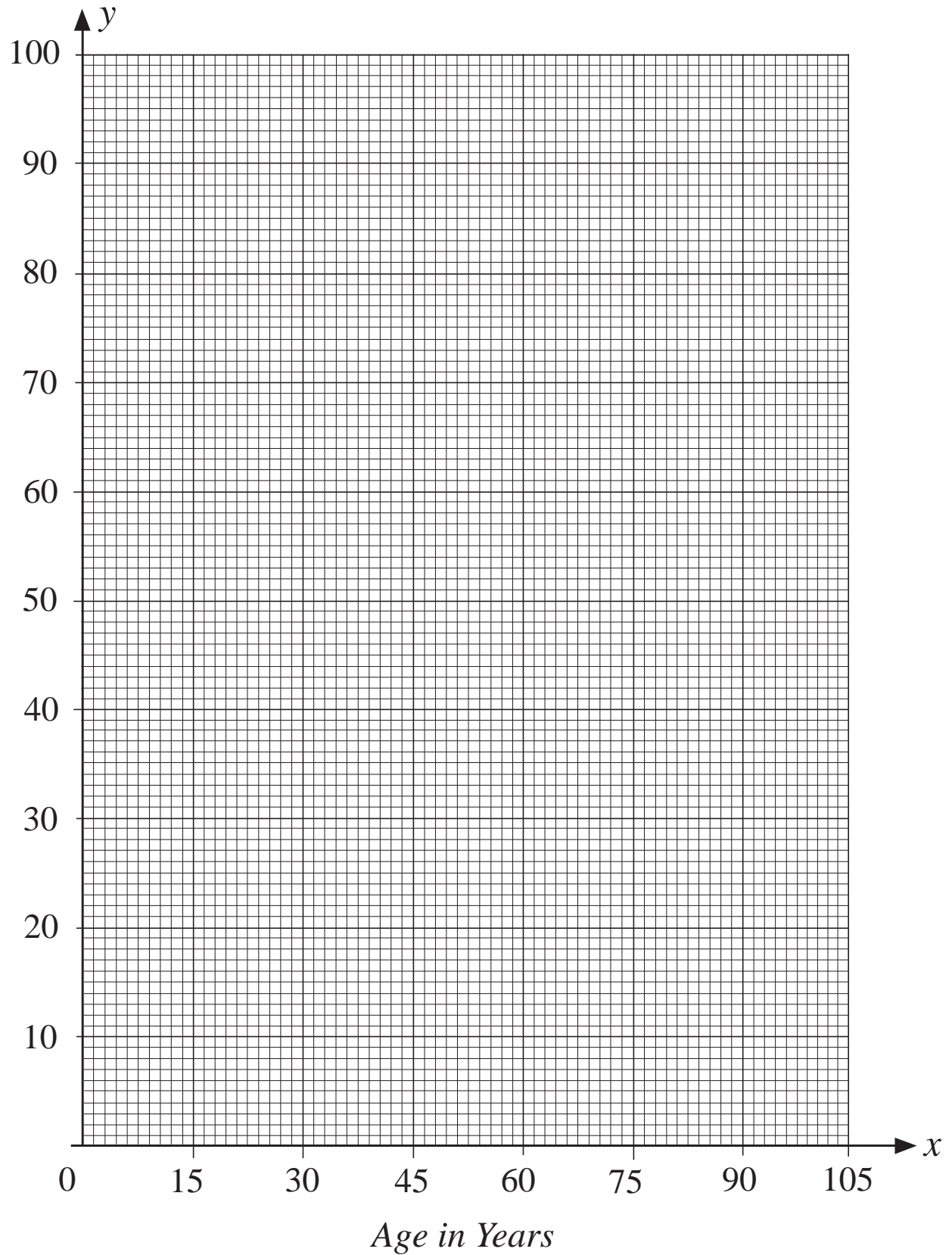
Find the cumulative frequencies and draw a cumulative frequency graph for the data.

- Estimate:
- (a) the median,
 - (b) the upper and lower quartiles,
 - (c) the inter-quartile range.

OS 9.4 Sheet 2

Cumulative Frequency Grid

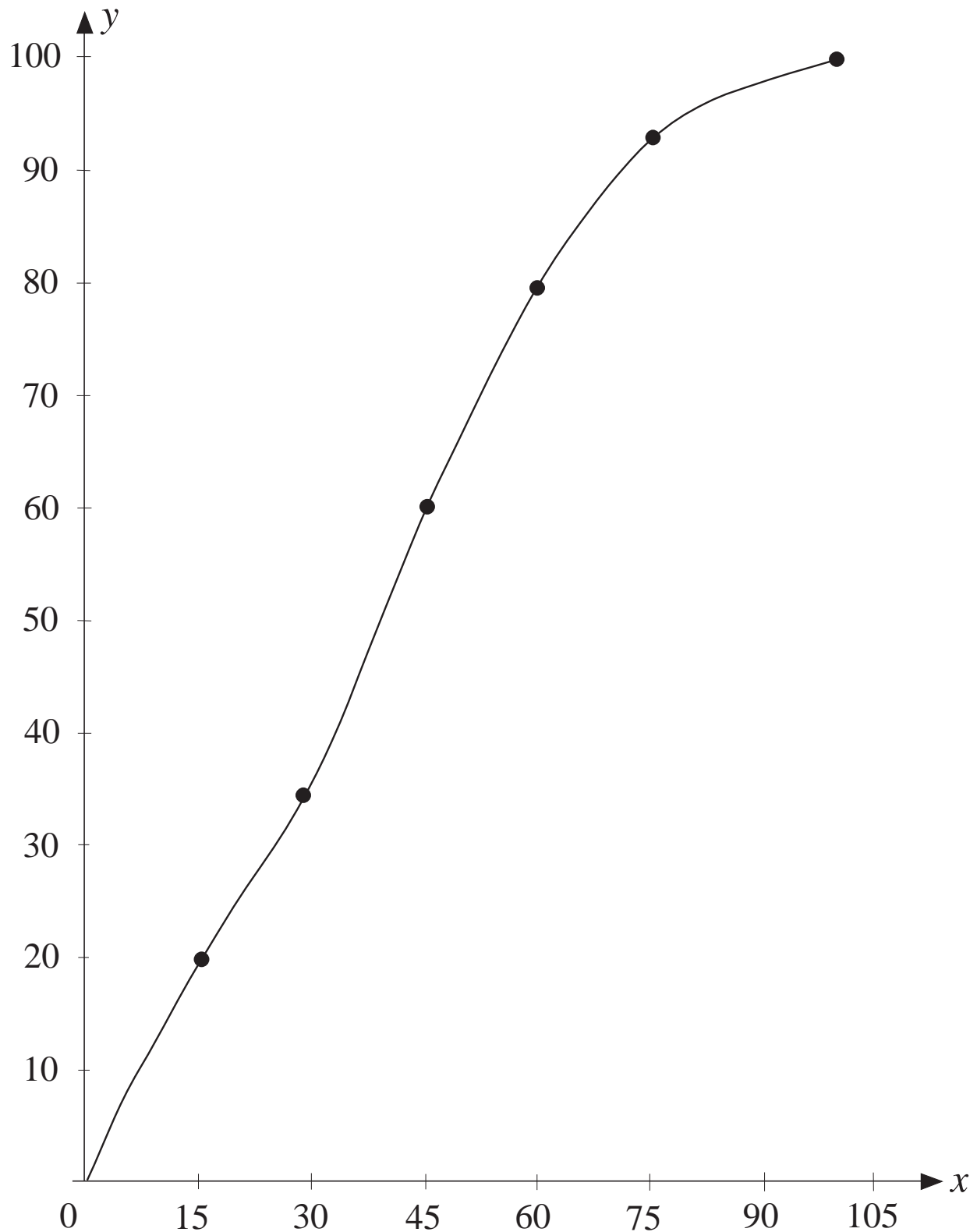
Cumulative % of Population



OS 9.5

Comparing Data

Cumulative frequency curve for the age distribution of the USA in 1991.



OS 9.6

Standard Deviation

The STANDARD DEVIATION (*s.d.*) of a set of data is a measure of the *spread* of the data about the mean and is defined by

$$s.d. = \sqrt{\frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2}$$

Consider the following sets of data. What is the mean (*M*) of each?

$$\begin{array}{lll}
 M = \underline{\hspace{2cm}} & S_1 = \{6, 7, 8, 9, 10\} & s.d. = \underline{\hspace{2cm}} \\
 \underline{\hspace{2cm}} & S_2 = \{4, 5, 8, 11, 12\} & \underline{\hspace{2cm}} \\
 \underline{\hspace{2cm}} & S_3 = \{1, 2, 8, 14, 15\} & \underline{\hspace{2cm}}
 \end{array}$$

For S the *standard deviation* can be calculated as:

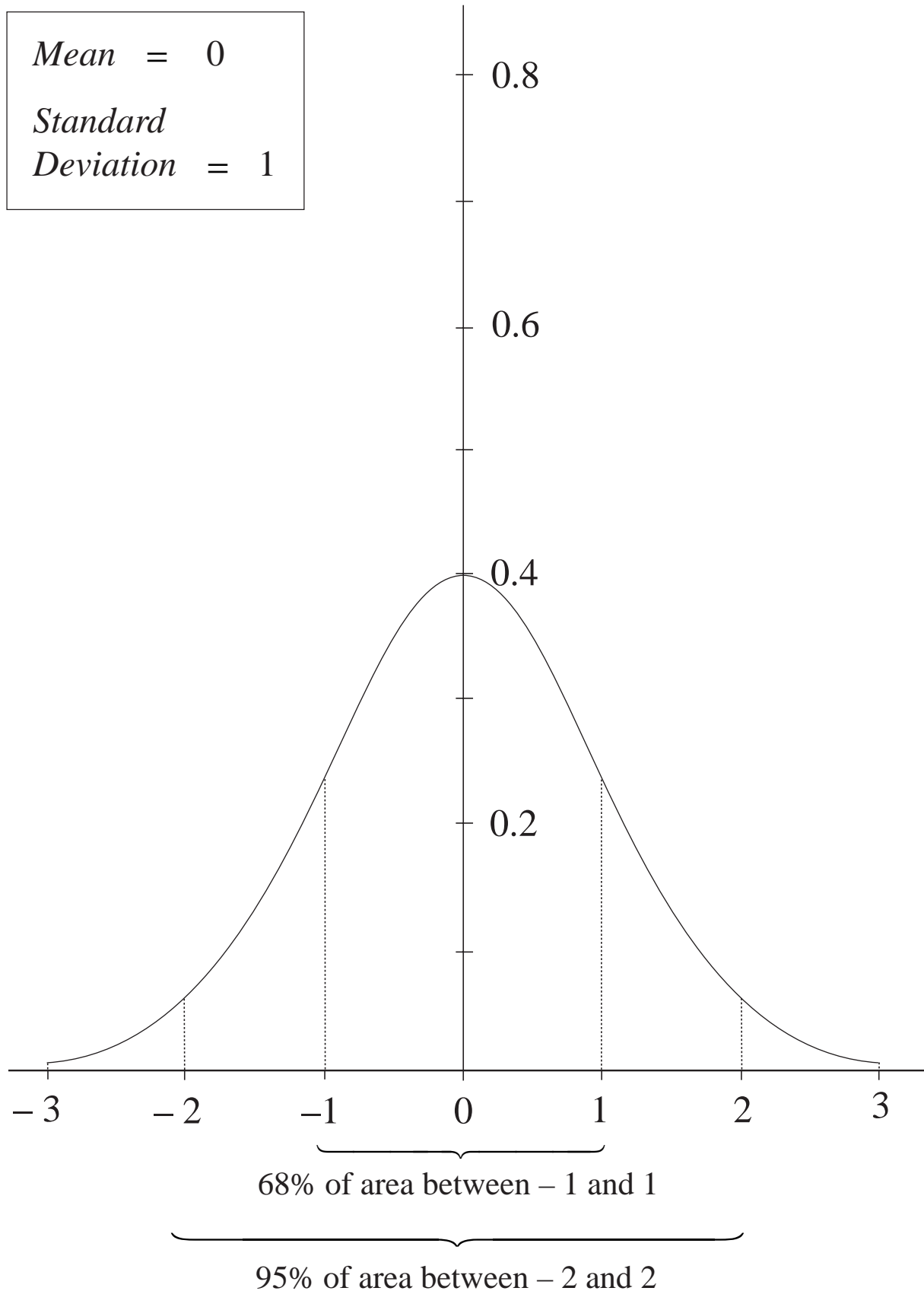
x_i	$x_i - \bar{x}$	$(x_i - \bar{x})^2$
TOTAL		

$$\begin{array}{l}
 s.d. = \sqrt{\hspace{2cm}} \\
 \\
 =
 \end{array}$$

Compare the standard deviations for S_1 , S_2 and S_3 .

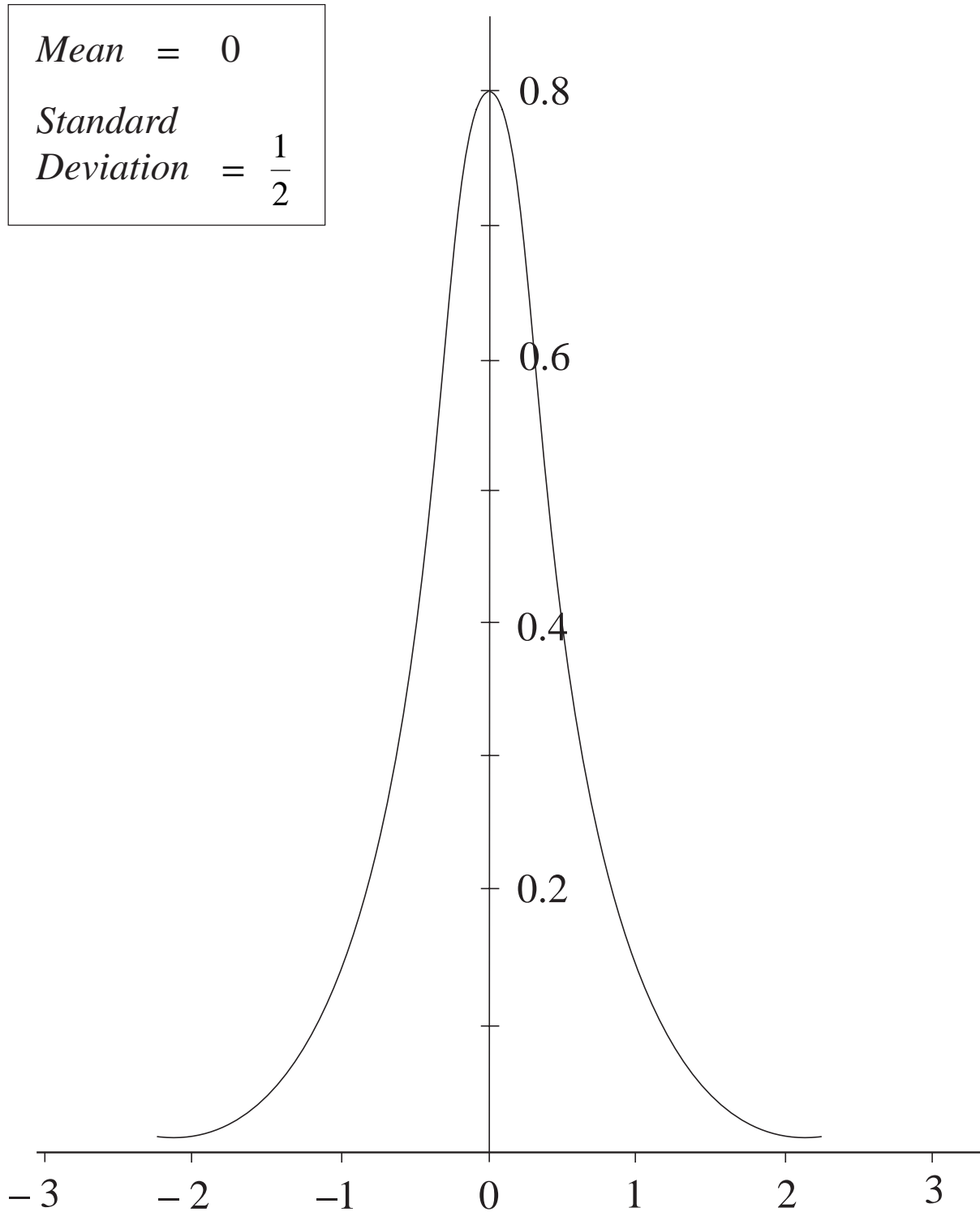
OS 9.7

Normal Distribution 1



OS 9.8

Normal Distribution 2



OS 9.9

Normal Distribution 3

Mean = 0
Standard Deviation = 2

