Example 1: Normal Distribution Examples: From Table 1, about 60% of data is below 69 and about 91% of data is below 82 (shaded rows).

Table 1

Simple Frequency Distribution Table

Frequency	**Percent**	**Cumulative Percent**
28	1.1	1.1
33	1.1	2.1
34	1.1	3.2
37	1.1	4.3
40	1.1	5.3
47	3.2	8.5
49	1.1	9.6
50	4.3	13.8
51	2.1	16.0
52	1.1	17.0
53	1.1	18.1
54	2.1	20.2
55	2.1	22.3
56	2.1	24.5
57	1.1	25.5
59	3.2	28.7
60	2.1	30.9
61	4.3	35.1
62	2.1	37.2
63	1.1	38.3
64	3.2	41.5
65	3.2	44.7
66	3.2	47.9
67	3.2	51.1
68	5.3	56.4
69	4.3	60.6
71	3.2	63.8
72	3.2	67.0
73	5.3	72.3
74	3.2	75.5
75	4.3	79.8
77	2.1	81.9
78	3.2	85.1
79	1.1	86.2
80	1.1	87.2
81	2.1	89.4
82	1.1	90.4
83	2.1	92.6
84	2.1	94.7
85	1.1	95.7
86	1.1	96.8
95	1.1	97.9
98	1.1	98.9
100	1.1	100.0

Exercise 2 – Descriptive Statistics of pass4th variable from ODE table.

Table 2

Descriptive Statistics: Mean, Median, and Mode

Statistics	**Values**
Mean	64.37
Median	66.50
Standard Deviation	15.29

N = 94

Exercise 3: z-score for Bluffton and VanBuren with interpretations.

From the ODE data table, we know that for the pass4th variable that *M* = 64.37 and *SD* = 15.29.

Bluffton schools:

If we would like to know how the Bluffton schools did relative to the rest of the schools that pass4th variable in ODE table we would compute Bluffton's z-score or standard score.

Bluffton observed score; *X* was 79, so its z-score is:

$$z = \frac{X - M}{S} = \frac{79 - 64.37}{15.29} = 0.96$$

The positive 0.96 tells us that Bluffton schools' scored above the mean of all the schools or their mean score is **0.96** standard deviation above the mean
(79 = 64.37 + 0.96 x 15.29). The percentile for this z-score (see z-score cumulative table) is 0.8315 or **83.15%** (0.8315 x 100). This means that 83.15% of the rest of the schools had their pass4th scores below that of Bluffton or that Bluffton's pass4th score is above 83.15% of the rest of the schools.

VanBuren schools:

If we would like to know how the VanBuren schools did relative to the rest of the schools for the pass4th variable in ODE table we would compute VanBuren's z-score or standard score. VanBuren's observed score, *X* was 57, so its z-score is:

$$z = \frac{X - M}{S} = \frac{57 - 64.37}{15.29} = -0.48$$

The negative 0.48 tells us that VanBuren school scored below the mean of all the schools or VanBuren's mean score is **0.48** standard deviation below the mean (-0.48 = 64.37 - 0.48 x 15.29). The percentile for this z-score (see the z-score cumulative table) is 0.3156 or **31.56%** (0.3156 x 100). This means that 31.56% of the rest of the schools had their pass4th scores below that of VanBuren or that VanBuren's pass4th score is higher than only 31.56% of the rest of the schools. One may also state that 68.44% (100 - 31.56) of the schools score higher than VanBuren for the pass4th variable.

Exercise 4 - The Normal Curve

Question 1. The normal distribution of IQ scores is 100 with a standard deviation of 16. If an individual with a tested IQ of 70 or below is considered mentally retarded, what percentage of the population would be classified retarded?

First commute the z-score and from the z-score probability table in Appendix, determine the percent less than that z-score.

$$z = \frac{X - M}{S} = \frac{70 - 100}{16} = -1.88$$

For z < -1.88, percent is 3.01%

State Answer: Therefore, ***3.01%*** of the population is considered retarded.

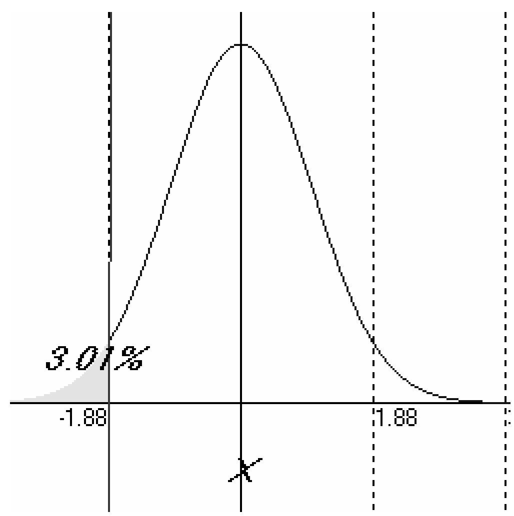

Figure 1. From normal curve: Percent < z = -1.88.

Question 2. If an IQ of 140 or above is necessary for a person to be considered mentally gifted, what percentage of the population is mentally gifted?

First commute the z-score and from the z-score probability table in Appendix, determine the percent above that z-score.

$$z = \frac{X - M}{S} = \frac{140 - 100}{16} = 2.50$$

For z > 2.50, percent is 0.62%

State Answer: Therefore, ***0.62%*** of the population is considered gifted.

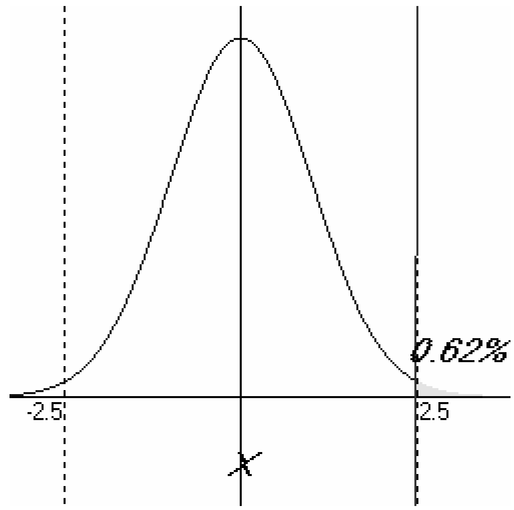

Figure 2. From normal curve: Percent > z = 2.50.

Question 3. If the range of “average” IQ scores is 90 to 110, what percentage of the population is considered average in intelligence?

First commute the z-scores and from the z-score probability table in Appendix, determine the percent between both z-scores.

$$z = \frac{X - M}{S} = \frac{90 - 100}{16} = -0.63$$

$$z = \frac{X - M}{S} = \frac{110 - 100}{16} = 0.63$$

For z = -0.63, percent is 26.43%
For z = +0.63, percent is 73.57%
Difference is 73.57 - 26.43 = 47.14%

State Answer: Therefore, ***47.14%*** of the population has average IQ score.

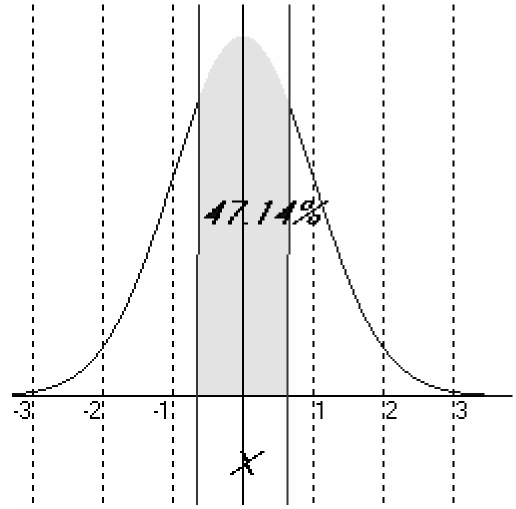

Figure 3. From normal curve: Percent between z = -0.63 and z = + 0.63