Exercises: Review questions and answers on topics covered in this unit.
Normal Distribution, standard normal curve, z-score, standard normal random variable

1. Which of the following are the properties of a normal distribution? (1)

a) The normal distribution curve is symmetric about the standard deviation.

b) The normal distribution curve is bimodal.

c) The normal distribution curve never crosses the x-axis.

d) The normal distribution curve is always positively skewed.

2. In a standard normal distribution, the value of mean is: (1)

a) ∞

b) 1

c) 0

d) Unknown

3. The area under a standard normal curve is (1)

a) 0

b) 1

c) ∞

d) 0.5

4. For symmetrical data distribution: (1)

a) Mean is greater than median and mode.

b) Mean is less than median and mode.

c) All measures of central tendency are equal.

d) All measures of dispersion are equal.

5. For negatively skewed data distribution: (1)

a) Mean is greater than median and mode

b) Mean is less than median and mode

c) All measures of central tendency are equal.

d) All measures of dispersion are equal.

6. Find the z-score for which the area under the standard normal curve to its left is 0.9599

(1)

a) 1.75

b) 0.38

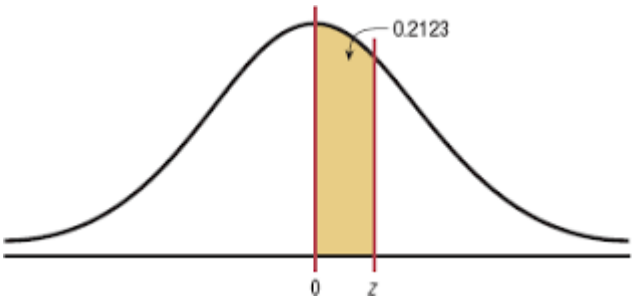
c) 1.03

d) 1.82

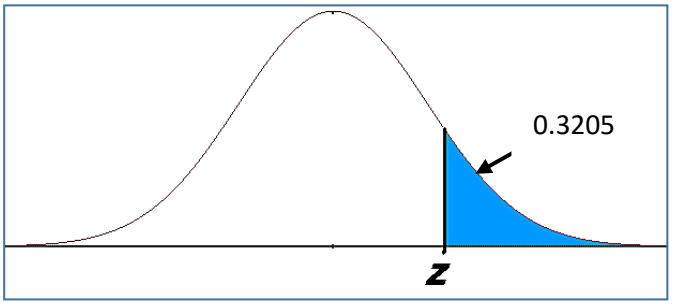
7. Z is a standard normal random variable. Find the value of Z if the area between the mean and Z is given on the graph. (2)

0.2123 + 0.5 = 0.7123 1 mark

Z = 0.56 1 mark, CAO



8. Find the value of Z if the area to the right of Z is given on the graph. (2)



1 – 0.3205 = 0.6795 1 mark

Z = 0.47 1 mark, CAO

For questions 9 to 13, please complete the sketch by shading the required area.

9. Find: $P(0 < z < 2.32)$ (3)

0.98983 – 0.5 = 0.48983

1 mark for shading

1 mark for 0.98983 seen only

1 mark for finding the probability

Accept any correctly rounded answer

10. $P(z > 1.65)$ (3)

1 – 0.95053 = 0.04947

1 mark for shading

1 mark for 0.95053 seen only

1 mark for finding the probability

Accept any correctly rounded answer

11. *P* (- 0.65 < *z* < *2.04*) (3)

0.97932 – 0.25785 = 0.72147

1 mark for shading

1 mark for 0.97932 and 0.25785 seen only

1 mark for finding the probability

Accept any correctly rounded answer

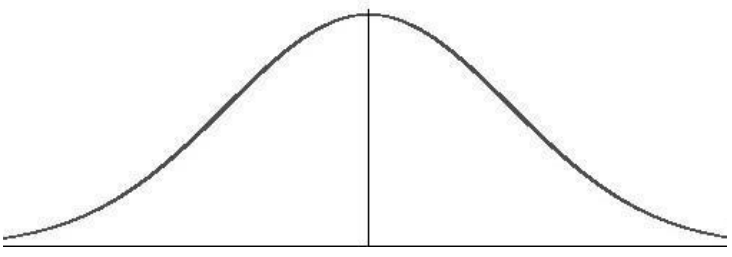
Take away a <u>total</u> of 0.25 for incorrect rounding either in question 9 or 10 or 11 or all

12. Battery lifetime is normally distributed for large samples. The mean lifetime is 500 days and the standard deviation is 61 days. What percent of batteries have lifetimes shorter than 455 days? Round your answer to the nearest whole number.

(3)

$Z = \frac{455-500}{61} = -0.7377 = -0.74$ 1 mark

1 mark for correct sketch



0.5 mark for 0.22965 seen only

0.22965 = 22.965 % = 23 % 0.5 mark

Take away 0.25 for incorrect rounding

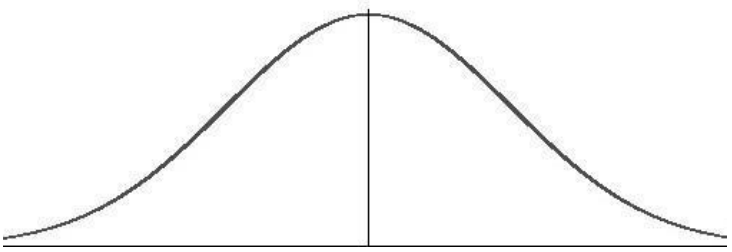
13. Each month, an American household generates an average of 28 pounds of the newspaper for garbage or recycling. Assume the standard deviation is 2 pounds. If a household is selected at random, find the probability of its generating

a. Between 26 and 32 pounds per month (3)

$Z = \frac{26-28}{2} = -1$ 0.5 mark

$Z = \frac{32-28}{2} = 2$ 0.5 mark

1 mark for correct sketch



0.5 mark for 0.15866 and 0.97725 seen only

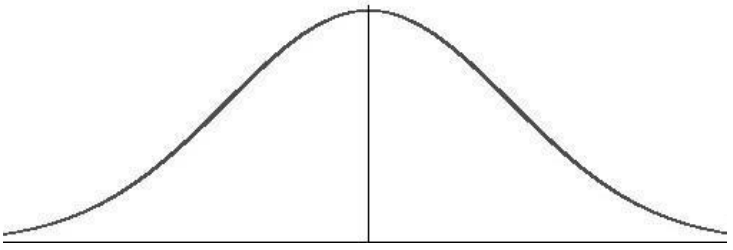
0.97725 – 0.15866 = 0.81859 0.5 mark

Accept any correctly rounded answer

b. More than 31.5 pounds per month (2)

$Z = \frac{31.5-28}{2} = 1.75$ 0.5 mark

0.5mark for correct sketch



0.5 mark for 0.95994 seen only

1 – 0.95994 = 0.04006 0.5 mark

Accept any correctly rounded answer

Take away a total of 0.25 for incorrect rounding either in part a or b or both