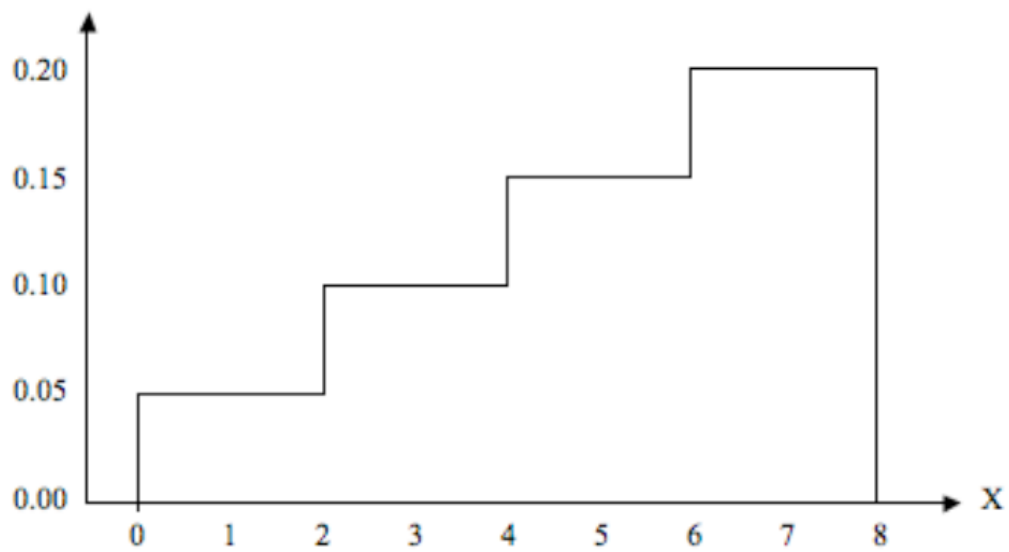


1. A variable X has a distribution which is described by the density curve shown below:



What proportion of values of X fall between 1 and 6?

- (A) 0.550 (B) 0.575 (C) 0.600 (D) 0.625 (E) 0.650

2. Which of the following statements about a normal distribution is true?

- (A) The value of μ must always be positive.
- (B) The value of σ must always be positive.
- (C) The shape of a normal distribution depends on the value of μ .
- (D) The possible values of a standard normal variable range from -3.49 to 3.49 .
- (E) The area under a normal curve depends on the value of σ .

Sample Term Test 2 – A

3. A variable X has a uniform distribution on the interval from 2 to 6.

The $P(4.2 < X < 5.7)$ is equal to:

(A) 0.375

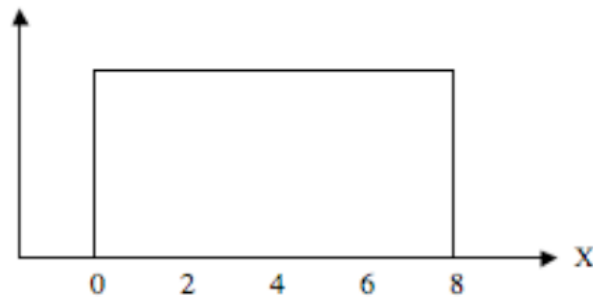
(B) 0.475

(C) 0.575

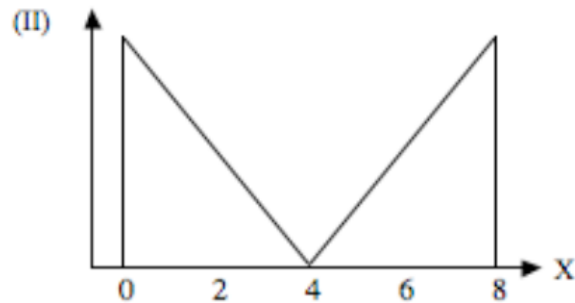
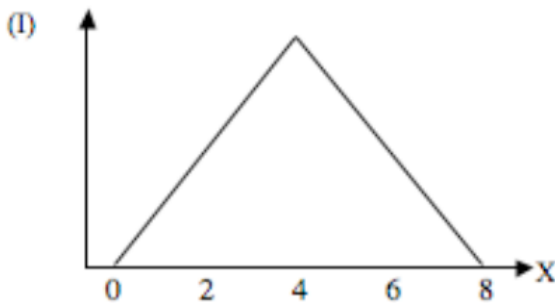
(D) 0.675

(E) 0.775

4. A variable X follows a uniform distribution, as shown below:



The distribution of X has an interquartile range equal to 4 (since the middle 50% of the data are contained between the values 2 and 6). Consider the variables with the distributions shown below (assume that the heights of the curves are such that they are both valid density curves):



The interquartile range of density curve (I) is _____ and the interquartile range of density curve (II) is _____.

- (A) (I) less than 4, (II) greater than 4
- (B) (I) greater than 4, (II) less than 4
- (C) (I) equal to 4, (II) equal to 4
- (D) (I) less than 4, (II) less than 4
- (E) (I) greater than 4, (II) greater than 4

Sample Term Test 2 – A

5. A variable Z has a standard normal distribution. What is the value b such that $P(-0.37 \leq Z \leq b) = 0.5749$?

(A) 2.02

(B) 1.48

(C) 0.97

(D) 0.63

(E) 1.72

Sample Term Test 2 – A

The next **three** questions (**6** to **8**) refer to the following:

The sport of women's gymnastics consists of four events. Suppose it is known that scores for each event follow a normal distribution with the following means and standard deviations:

Event	Mean	Std. Dev.
Balance Beam	8.3	0.3
Uneven Bars	8.6	0.5
Vault	8.2	0.4
Floor Exercise	9.0	0.2

6. What proportion of gymnasts receives a score between 8.2 and 8.7 on the uneven bars?

- (A) 0.2088 (B) 0.3674 (C) 0.6000 (D) 0.6837 (E) 0.3085

Sample Term Test 2 – A

7. The top 6% of gymnasts in each event earn a trip to the national championships. What is the minimum vault score required to make it to the nationals?

(A) 8.44

(B) 7.58

(C) 8.90

(D) 8.41

(E) 8.82

Sample Term Test 2 – A

8. Julie receives a score of 9.0 on the balance beam, 9.2 on the uneven bars, 9.1 on the vault and a 9.3 on floor exercise. In which event did Julie do the best relative to other gymnasts?
- (A) Balance Beam
 - (B) Uneven Bars
 - (C) Vault
 - (D) Floor Exercise
 - (E) Julie did equally well on all events.

Sample Term Test 2 – A

9. Suppose that the variable Z follows a standard normal distribution.

If $P(-b < Z < b) = 0.92$, then b is approximately:

(A) 1.75

(B) 1.41

(C) 0.82

(D) 1.64

(E) 0.96

Sample Term Test 2 – A

10. A variable X has a normal distribution with mean 100. It is known that about 47.5% of the values of X fall between 85 and 100. What is the approximate value of the standard deviation σ ?

(A) 5

(B) 7.5

(C) 12.5

(D) 15

(E) 30

Sample Term Test 2 – A

11. Speeds of vehicles on a highway follow a normal distribution with mean 106.2 km/h and standard deviation 8.7 km/h. What proportion of vehicles on this highway are travelling above the 100 km/h speed limit?

- (A) 0.7126 (B) 0.2612 (C) 0.7910 (D) 0.2874 (E) 0.7611

Sample Term Test 2 – A

12. The time to complete a particular exam is approximately normally distributed with a mean of 90 minutes and a standard deviation of 10 minutes. What percentage of students will take longer than 95 minutes to complete the exam?

- (A) 50.00% (B) 69.15% (C) 30.85% (D) 19.15% (E) 22.85%

Sample Term Test 2 – A

13. The time it takes skiers to finish a downhill race follows a normal distribution with mean 58.47 seconds and standard deviation 1.62 seconds. What proportion of skiers finish the race in exactly 60 seconds?

- (A) 0.0556 (B) 0.1736 (C) 0.0122 (D) 0.0409 (E) 0.0000

Sample Term Test 2 – A

14. Percentage grades in a large Calculus class follow a normal distribution with mean 60 and standard deviation 10. Percentage grades in a large English class follow a normal distribution with mean 68 and standard deviation 8. Katherine received a grade of 85 in Calculus. What grade does she need in English to be at the same percentile?

(A) 87

(B) 88

(C) 89

(D) 90

(E) 91

Sample Term Test 2 – A

15. Bottles of a certain brand of apple juice are filled automatically by a machine. Fill volumes are normally distributed with a mean of μ and standard deviation of 1.46 ml. The label on the bottles claim that the bottles contain 500 ml of juice. What value should μ be set at so that only 2% of bottles will be underfilled?

- (A) 497 ml (B) 498 ml (C) 502 ml (D) 503 ml (E) 504 ml

16. A normal quantile plot is a useful tool to determine whether it is plausible that a variable has a normal distribution. Using a normal quantile plot, we conclude that a normal distribution is a reasonable assumption if:

- (A) all points fall close to a straight horizontal line.
- (B) all points fall close to a straight vertical line.
- (C) all points fall close to a straight diagonal line.
- (D) all points fall close to a bell-shaped curve.
- (E) the points appear randomly scattered.

Sample Term Test 2 – A

17. It is known that 53% of students at a large university are female and 47% are male. If we take a random sample of 12 students at the university, what is the probability that exactly seven of them are female?

- (A) 0.1734 (B) 0.1834 (C) 0.1934 (D) 0.2034 (E) 0.2134

Sample Term Test 2 – A

18. From past records, the professor of a large university course has established the following distribution for grades received by students in the course (with some values missing):

Grade	A+	A	B+	B	C+	C	D	F
Probability	0.08	0.17	???	0.13	???	0.22	0.09	0.07

What is the probability of getting a grade of C+ or better?

- (A) 0.50
- (B) 0.62
- (C) 0.76
- (D) impossible to calculate without at least one of the missing probabilities.
- (E) impossible to calculate without both of the missing probabilities.

Sample Term Test 2 – A

19. The number of courses X taken in one term by students at a large university has the probability distribution shown below, where k is some constant:

x	1	2	3	4	5	6
$P(X = x)$	0.05	k	0.21	$3k$	0.32	$2k$

What is the probability that a randomly selected student is taking at least 3 courses in one term?

(A) 0.81

(B) 0.53

(C) 0.76

(D) 0.88

(E) 0.69

Sample Term Test 2 – A

The next **two** questions (**20** and **21**) refer to the following:

The following five games are scheduled to be played at the World Curling Championship one morning. The values in parentheses are the probabilities of each team winning their respective game.

Game 1: Finland (0.43)	vs.	Germany (0.57)
Game 2: USA (0.28)	vs.	Switzerland (0.72)
Game 3: Japan (0.11)	vs.	Canada (0.89)
Game 4: Denmark (0.33)	vs.	Sweden (0.67)
Game 5: France (0.18)	vs.	Scotland (0.82)

20. The outcome of interest is the set of winners of the five games. How many outcomes are contained in the sample space?

- (A) 5 (B) 10 (C) 25 (D) 32 (E) 64

Sample Term Test 2 – A

21. In a sports game, the “favourite” is the team with the higher probability of winning and the “underdog” is the team who is less likely to win. What is the probability that at least one underdog wins?

(A) 0.93

(B) 0.74

(C) 0.80

(D) 0.67

(E) 0.59

Sample Term Test 2 – A

22. A manufacturer of automobile batteries claims that the distribution of battery lifetimes has a mean of 54 months and a variance of 36 months squared. Suppose a consumer group decides to check the claim by purchasing a sample of 50 of these batteries and subjecting them to tests to determine their lifetime. Assuming the manufacturer's claim is true, what is the probability that the sample has a mean lifetime less than 52 months?

- (A) 0.1292 (B) 0.3707 (C) 0.0091 (D) 0.4909 (E) 0.3483

Sample Term Test 2 – A

23. A recently married couple plans to have two children. The outcome of interest is the gender of each of the two children. Consider the event that exactly one of the couple's children will be a boy. Which of the following is the complement of this event?
- (A) two boys
 - (B) two girls
 - (C) one girl
 - (D) at least one girl
 - (E) zero or two girls

Sample Term Test 2 – A

24. The monthly mortgage payment for recent home buyers in Winnipeg has a mean of \$732, and a standard deviation of \$421. A random sample of 125 recent home buyers is selected. The approximate probability that their average monthly mortgage payment will be more than \$782 is:

- (A) 0.9082 (B) 0.4522 (C) 0.4082 (D) 0.0478 (E) 0.0918

Sample Term Test 2 – A

25. Weights of pears in an orchard follow a normal distribution with mean 195 grams and standard deviation 40 grams. A random sample of five pears is selected. What is the probability that the total weight of the pears is greater than one kilogram (i.e., 1,000 grams)?

(A) 0.2795

(B) 0.3897

(C) 0.2451

(D) 0.3264

(E) 0.4129

Sample Term Test 2 – A

26. The fact that the sample mean does not tend to over- or underestimate the population mean makes the sample mean:
- (A) resistant.
 - (B) unbiased.
 - (C) efficient.
 - (D) a statistic.
 - (E) a parameter.

Sample Term Test 2 – A

27. According to the Canadian Blood Services website, 9% of Canadians have type B blood. If a sample of 8 donors is selected, what is the probability that less than two of them will have type B blood?

(A) 0.8424

(B) 0.9711

(C) 0.3721

(D) 0.4703

(E) 0.1576

Sample Term Test 2 – A

28. A random variable X follows a uniform distribution with mean 3 and standard deviation 1.73. We take a random sample of size 100 from this distribution and calculate the sample mean \bar{X} . The sampling distribution of \bar{X} is:
- (A) approximately normal with mean 3 and standard deviation 0.173.
 - (B) uniform with mean 3 and standard deviation 1.73.
 - (C) approximately normal with mean 3 and standard deviation 0.0173.
 - (D) uniform with mean 3 and standard deviation 0.173.
 - (E) approximately normal with mean 3 and standard deviation 1.73.

Sample Term Test 2 – A

29. There are four patients on the neo-natal ward of a local hospital who are monitored by two staff members. Suppose the probability (at any one time) of a patient requiring attention by a staff member is 0.3. Assuming the patients behave independently, what is the probability at any one time that there will not be sufficient staff to attend to all patients who need them?

- (A) 0.0756 (B) 0.1104 (C) 0.0837 (D) 0.0463 (E) 0.2646

30. Which of the following variables has a binomial distribution?

- (I) You repeatedly roll a fair die.
 X = number of rolls needed to observe the number 6 for the third time.
- (II) Tim Horton's is holding its annual "Roll Up the Rim to Win" promotion. Customers can check under the rim of a coffee cup to see if they have won a prize. You buy one cup of coffee from Tim Horton's each day for a week.
 X = number of times you win a prize during the week.
- (III) A quality control inspector in a factory routinely examines samples of fiber-optic cable being produced to check for defects. The inspector examines a 100-foot length of cable.
 X = number of defects found on the cable.

- (A) I only
- (B) II only
- (C) I and II only
- (D) II and III only
- (E) I, II, and III