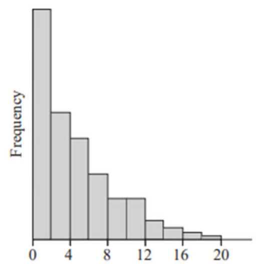
$\hat{p}\mathbb{R}\sigma\hat{j}e\mathbb{C}\tau^{152}$ Phase 26 Tech Free

Question 1

QUESTION 10

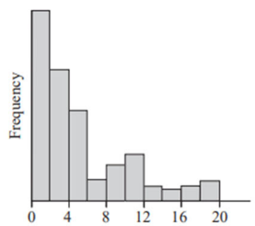
Simple Familiar
Technology Free
2023

A random variable is drawn from a population with the distribution shown in the histogram.

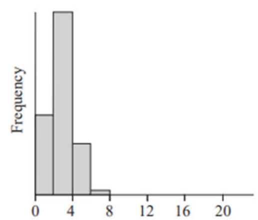


A number of samples of size 10 were randomly selected from this distribution and the sample means, $\overline{x}$, were recorded. The histogram that most likely represents the distribution of the sample means is

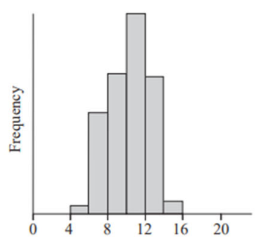
(A)



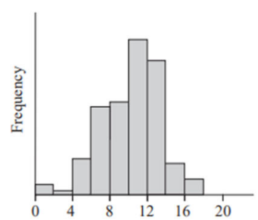
(B)



(C)



(D)



Question 2

QUESTION 5

Simple Familiar
Technology Free
2023

A confidence interval for a parameter is a range of values within which the

(A) sample estimate of the parameter always lies.

(B) sample estimate of the parameter never lies.

(C) parameter always lies.

(D) parameter never lies.

Question 3

QUESTION 12 (5 marks)

Simple Familiar
Technology Free
2023

Given $\boldsymbol{A}=\begin{pmatrix}1 & -2\\ 1 & 2\end{pmatrix}$, $\boldsymbol{B}=\begin{pmatrix}0 & 2\\ 1 & 3\end{pmatrix}$ and $\boldsymbol{C}=\begin{pmatrix}-1 & -1\\ 0 & 3\end{pmatrix}$, determine $\boldsymbol{X}$ in the matrix equation $\boldsymbol{XA}-\boldsymbol{XC}=\boldsymbol{B}$.

Question 4

QUESTION 15 (5 marks)

Simple Familiar
Technology Free
2023

The sum of a geometric progression with n terms, where the first term is 1 and the common ratio is r, is given by

$$1+r+r^2+r^3+\ldots+r^{n-1}=\frac{r^n-1}{r-1} \quad (\text{for } r\neq 1).$$

Prove that this rule is true $\forall n\in Z^+$ using mathematical induction by completing the steps of the proof as indicated.

a) Initial statement: *[1 mark]*

Assuming the rule is true for $n=k$,

$$1+r+r^2+r^3+\ldots+r^{k-1}=\frac{r^k-1}{r-1} \quad (r\neq 1).$$

b) Inductive step: *[3 marks]*

c) Conclusion: *[1 mark]*

Question 5

QUESTION 18 (6 marks)

Simple Familiar
Technology Free
2023

A particular solution to the differential equation $\frac{dy}{dx}=\frac{x}{(x^2+1)\tan(y)}$, where $x\geq 0$ and $-\frac{\pi}{2}<y\leq 0$, passes through the origin.

Determine this solution in the form $x=f(y)$. Leave your answer in simplified form.

Question 6

QUESTION 19 (7 marks)

Complex Unfamiliar
Technology Free
2022

The function $f(x)$ passes through the origin.

The gradient function of $f(x)$ is defined as $g(x)=e^x\sin^{-1}(e^x)$.

Determine $f(x)$.