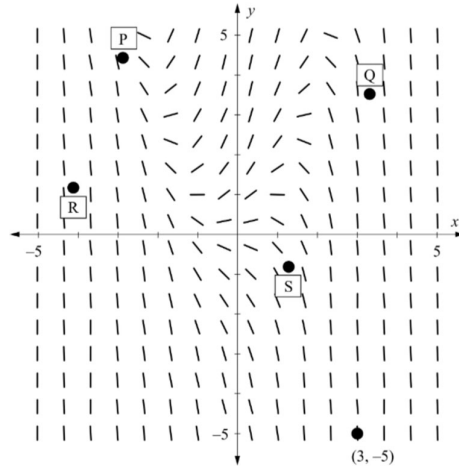


Question 1

QUESTION 9

Simple Familiar
Technology Free
2021

The slope field for the differential equation $\frac{dy}{dx} = y - x^2$ is shown.



The solution curve to the differential equation that passes through the point $(3, -5)$ also passes through point

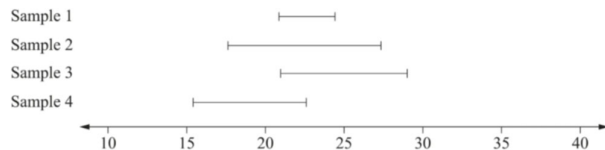
- (A) P
- (B) Q
- (C) R
- (D) S

Question 2

QUESTION 5

Simple Familiar
Technology Free
2022

Four random samples of different sizes were taken to estimate a certain population mean, given a known population standard deviation. A 95% confidence interval was calculated for each sample.



Which sample used the largest sample size?

- (A) Sample 1
- (B) Sample 2
- (C) Sample 3
- (D) Sample 4

Question 3

QUESTION 9

Simple Familiar
Technology Free
2022

A random variable X is normally distributed with a mean of 36 and a standard deviation of 4.

The respective mean and standard deviation of the distribution of \bar{X} from repeated random samples of size 9 are

- (A) 4 and $\frac{4}{9}$
- (B) 4 and $\frac{4}{3}$
- (C) 36 and $\frac{4}{9}$
- (D) 36 and $\frac{4}{3}$

Question 4

QUESTION 2

Simple Familiar
Technology Free
2022

Which statement regarding sample means is true?

- (A) The distribution of X is always normally distributed.
- (B) The distribution of \bar{X} is always normally distributed.
- (C) The value of \bar{x} changes when different samples are selected.
- (D) The value of μ changes when different samples are selected.

Question 5

QUESTION 13 (5 marks)

Simple Familiar
Technology Free
2023

Given $z \in C$, where $z \neq 0$, prove $\frac{|z|}{z\bar{z}} = |z^{-1}|$.

Question 6

QUESTION 17 (7 marks)

Complex Familiar
Technology Free
2023

An object of mass 2 kg is moving with a constant velocity (m s^{-1}) of $\mathbf{v} = 3\hat{i} + \hat{k}$.

At an instant, two forces (N), $\mathbf{F}_1 = 5t\hat{j} - 3\hat{k}$ and $\mathbf{F}_2 = -t\hat{j} + \hat{k}$, act simultaneously on the object for t seconds, where $0 \leq t \leq 2$.

Determine the magnitude of the momentum of the object when $t=1$.

Question 7

QUESTION 18 (6 marks)

Complex Unfamiliar
Technology Free
2021

This differential equation can be used to determine the current I (amperes) at time t (seconds) with voltage V (volts) in an electric circuit containing a resistance R (ohms):

$$k \frac{dI}{dt} + RI = V$$

where k , R and V are positive constants and $t \geq 0$.

Assuming that there is no current in the electric circuit initially, show that the size of the current can never be greater than $\frac{V}{R}$.