

Course outline

How does an NPTEL online course work?

Week 1: Real number system and Limits

- Lecture 1: Real numbers and Archimedean property
- Lecture 2: Supremum and Decimal representation of Reals
- Lecture 3: Functions
- Lecture 4: Functions continued and Limits
- Lecture 5: Limits continued.

Quiz : Assignment 1

- Feedback for Week 1
- Assignment 1 Solution

Week 2: Continuity and Differentiation of functions

Week 3: Plotting graph of functions

Week 4: L'Hospital Rule and Integration

Week 5: Integration and its numerical methods

Week 6: Applications of Integration

Week 7: Improper Integrals, Sequences and Series

Week 8: Series and its convergence

DOWNLOAD VIDEOS

Assignment 1

The due date for submitting this assignment has passed.

Due on 2021-02-03, 23:59 IST.

As per our records you have not submitted this assignment.

1) Which of the following number is rational?

1 point

- The roots of the equation $x^2 - 12 = 0$.
- $(\sqrt{2}\sqrt{2})^{\sqrt{2}}$.
- 0.110100100010000 ...
- $\inf\{\frac{1}{n^2} : n \in \mathbb{N}\}$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $(\sqrt{2}\sqrt{2})^{\sqrt{2}}$.
- $\inf\{\frac{1}{n^2} : n \in \mathbb{N}\}$.

2) Which of the following statement(s) is/are true.

1 point

- $\sup\{1 - \frac{(-1)^n}{n} : n \in \mathbb{N}\}$ is 2.
- $\inf\{1 - \frac{(-1)^n}{n} : n \in \mathbb{N}\}$ is 1.
- If a set S contains one of its upper bound then this upper bound is the supremum of the set S .
- Let $A \subset B \subset \mathbb{R}$. Then $\inf A \leq \inf B$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $\sup\{1 - \frac{(-1)^n}{n} : n \in \mathbb{N}\}$ is 2.
- If a set S contains one of its upper bound then this upper bound is the supremum of the set S .

3) Which of the following statement(s) are true?

1 point

- The range of $x - |x|$ is contained in $[-1, 1]$.
- Let $f(x) = e^x(x^2 - 9x + 20)$. Then the set of x for which $f(x) > 0$ is contained in $(-\infty, 4) \cup (5, \infty)$.
- The domain of $\frac{1}{\sin x \sqrt{25-x^2}}$ is $(-5, 5)$.
- Let $f(x) = x^2 - 1$ and $g(x) = \cos x$. Then the range of $f \circ g$ is $[-1, 0]$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- Let $f(x) = e^x(x^2 - 9x + 20)$. Then the set of x for which $f(x) > 0$ is contained in $(-\infty, 4) \cup (5, \infty)$.
- Let $f(x) = x^2 - 1$ and $g(x) = \cos x$. Then the range of $f \circ g$ is $[-1, 0]$.

 4) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ satisfies $f(x + y) = f(x) + f(y)$ for all $x, y \in \mathbb{R}$. Which of the following statement(s) is/are true.

1 point

- $f(0) = 0$.
- If $n \in \mathbb{N}$ then $f(n) = nf(1)$.
- $f(-1) = -f(1)$.
- $f(x) = xf(1)$ if $x \in \mathbb{Q}$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $f(0) = 0$.
- If $n \in \mathbb{N}$ then $f(n) = nf(1)$.
- $f(-1) = -f(1)$.
- $f(x) = xf(1)$ if $x \in \mathbb{Q}$.

5) Which of the following functions are odd functions.

1 point

- $(e^x - e^{-x}) \cos x$.
- Product of 2 odd functions.
- $x^5 + \sin x^3$.
- $x + |x|^7$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $(e^x - e^{-x}) \cos x$.
- $x^5 + \sin x^3$.

 6) Which of the following functions are increasing functions in the interval $(0, 1)$.

1 point

- $\sin x$.
- $\cos x$.
- $f(x) = \begin{cases} 3^{2x}x & \text{if } x \leq \frac{1}{2} \\ 4x + 2 & \text{if } x > \frac{1}{2} \end{cases}$.
- $x^2 - x^3$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $\sin x$.
- $f(x) = \begin{cases} 3^{2x}x & \text{if } x \leq \frac{1}{2} \\ 4x + 2 & \text{if } x > \frac{1}{2} \end{cases}$.

 7) Which of the following interval is the solution set for $|x - 3| + |x + 2| < 11$.

1 point

- $(1, 6)$
- $[-2, 7]$.
- $[-5, 6]$.
- $(-5, 6)$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $(-5, 6)$.

8) Which of the following statements is/are correct.

1 point

- $\lim_{x \rightarrow 0} (f(x))^2 = 0 \Rightarrow \lim_{x \rightarrow 0} f(x) = 0$.
- $\lim_{x \rightarrow 0} (f(x))^2 = 4 \Rightarrow \lim_{x \rightarrow 0} f(x) = 2$.
- $\lim_{x \rightarrow -1} x^{2021} = 1$.
- If $\lim_{x \rightarrow 1} f(x) = 3$ then $f(1) = 3$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $\lim_{x \rightarrow 0} (f(x))^2 = 0 \Rightarrow \lim_{x \rightarrow 0} f(x) = 0$.

 9) If $\lim_{x \rightarrow a} f(x) = L$ then which of the following statements is/are true.

1 point

- For all $\epsilon > 0$ there exists $\delta > 0$ such that $|f(x) - L| < \epsilon$ whenever $|x - a| < \delta$.
- For all $\delta > 0$ there exists $\epsilon > 0$ such that $|f(x) - L| < \epsilon$ whenever $|x - a| < \delta$.
- There exists $\epsilon > 0$ for every $\delta > 0$ such that $|f(x) - L| < \epsilon$ whenever $|x - a| < \delta$.
- For every $\delta > 0$ and for all $\epsilon > 0$, $|f(x) - L| < \epsilon$ whenever $|x - a| < \delta$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- For all $\epsilon > 0$ there exists $\delta > 0$ such that $|f(x) - L| < \epsilon$ whenever $|x - a| < \delta$.

10) Which of the following statements are correct?

1 point

- $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$.
- $\lim_{x \rightarrow 0} \frac{(x+1)^2 - 1}{x} = 0$.
- $\lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - \sqrt{1+3x}}{x+2x^2} = -\frac{1}{2}$.
- $\lim_{x \rightarrow 0} \frac{\sin x^2}{x} = 1$.

 No, the answer is incorrect.
Score: 0

Accepted Answers:

- $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$.
- $\lim_{x \rightarrow 0} \frac{\sqrt{1+2x} - \sqrt{1+3x}}{x+2x^2} = -\frac{1}{2}$.