

## Course outline

How does an NPTEL online course work?

Week 1: Real number system and Limits

Week 2: Continuity and Differentiation of functions

- Lecture 6: Limits (continued) and Continuity
- Lecture 7: Continuity and Intermediate Value Property
- Lecture 8: Differentiation
- Lecture 9: Chain Rule
- Lecture 10: Nth derivative of a function

 Quiz : Assignment 2

 Feedback for Week 2

 Assignment 2 Solution

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

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# Assignment 2

The due date for submitting this assignment has passed.

**Due on 2021-02-07, 23:59 IST.**

As per our records you have not submitted this assignment.

- 1) Let  $f(x) = \begin{cases} x^3 - 2x & x > 1 \\ -1 & x = 1 \\ \tan(\frac{\pi x}{4}) & -1 < x < 1 \\ \frac{1}{x} & x \leq -1 \end{cases}$ . Then points of continuity of  $f$  are **1 point**

- $[1, \infty)$ .  
  $\mathbb{R}$ .  
  $\mathbb{R} \setminus \{1\}$ .  
  $\mathbb{R} \setminus \{-1\}$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\mathbb{R} \setminus \{1\}$ .

- 2) The set of discontinuities of  $f(x) = \begin{cases} \frac{3x-2}{\sin(\pi x)} & x \notin \mathbb{Z} \\ 0 & x \in \mathbb{Z} \end{cases}$  are **1 point**

- $\{\frac{2}{3}\}$ .  
  $\{0, \frac{2}{3}\}$ .  
  $\mathbb{Z} \cup \{\frac{2}{3}\}$ .  
  $\mathbb{Z}$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\mathbb{Z}$ .

- 3) Which of the following are correct: **2 points**

- $f : [0, 1] \rightarrow \mathbb{R}$  be continuous such that  $f(0) \neq f(1)$ , then range of  $f$  contains an interval.  
 If  $f : [0, 1] \rightarrow [0, 1]$  is continuous then there exists  $x \in [0, 1]$  such that  $f(x) = x$ .  
  $x^{2021} - 2020x^{20} + 202 = 0$  has no real roots.  
  $\frac{3x^5+5x^3-10x+1}{2x-5} = 0$  has atleast one solution in  $(0, 1)$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $f : [0, 1] \rightarrow \mathbb{R}$  be continuous such that  $f(0) \neq f(1)$ , then range of  $f$  contains an interval.

If  $f : [0, 1] \rightarrow [0, 1]$  is continuous then there exists  $x \in [0, 1]$  such that  $f(x) = x$ .

$\frac{3x^5+5x^3-10x+1}{2x-5} = 0$  has atleast one solution in  $(0, 1)$ .

- 4) Let  $f(x) = \ln\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)$ ,  $x > 0$ , then  $f'(x)$  is **1 point**

- $\frac{1}{\sqrt{x} + \frac{1}{\sqrt{x}}}$ .  
  $\frac{x-1}{2x(x+1)}$ .  
  $\frac{x-1}{2x^{\frac{3}{2}}}$ .  
  $\frac{x-1}{2(x+1)}$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\frac{x-1}{2x(x+1)}$ .

- 5) Let  $f(x) = e^{\sin x^2}$ ,  $x \in \mathbb{R}$ , then  $f'(x)$  is **1 point**

- $e^{\sin x^2} \cos x^2$ .  
  $e^{\cos x^2} \cos x^2$ .  
  $2xe^{\cos x^2} \cos x^2$ .  
  $2xe^{\sin x^2} \cos x^2$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $2xe^{\sin x^2} \cos x^2$ .

- 6) The volume of a cube is increasing at the rate of  $12cm^3s^{-1}$ . The rate of increase of the surface area of the cube when the side of the cube is 16 cm, is **1 point**

- $1cm^2s^{-1}$ .  
  $2cm^2s^{-1}$ .  
  $3cm^2s^{-1}$ .  
  $4cm^2s^{-1}$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $3cm^2s^{-1}$ .

- 7) The equation of a curve is  $x^3 + y^3 = 9xy$ , then  $\frac{dy}{dx}$  is **1 point**

- $\frac{x^2-3y}{3x-y^2}$ .  
  $\frac{y^2-3x}{3y-x^2}$ .  
  $3(x^2 + y^2)$ .  
  $\frac{x^2+y^2}{3x}$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\frac{x^2-3y}{3x-y^2}$ .

- 8) Let  $y = \ln(\sin x)$ , then **1 point**

- $\frac{dy}{dx} = \frac{1}{\sin x}$ .  
  $\frac{dy}{dx} = \ln(\sin x) \cos x$ .  
  $\frac{d^2y}{dx^2} = -\frac{1}{\sin^2 x}$ .  
  $\frac{d^2y}{dx^2} = -\sec^2 x$ .

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $\frac{d^2y}{dx^2} = -\frac{1}{\sin^2 x}$ .

- 9) Let  $y = mx + c$  be the tangent to the curve  $y = x^4 - x^3$  at the point  $(1, 0)$ . Then which of the following is true? **1 point**

- $c = 0$ .  
  $(1, 0)$  does not lie on the tangent.  
  $m = -1$ .  
  $y = x + 1$  is parallel to the tangent.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $y = x + 1$  is parallel to the tangent.