

# JEE MAIN

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## 1. Multiple Choice Questions

- 1) Let  $f(x)$  be a polynomial function of second degree. If  $f(1)=f(-1)$  and  $a, b, c$  are in A.P, then  $f'(a), f'(b), f'(c)$  are in [2003]
  - a) Arithmetic-Geometric Progression
  - b) A.P
  - c) G.P
  - d) H.P
- 2) If  $x=e^{y+e^{y+e^{y+\dots}}}$ ,  $x > 0$ , then  $\frac{dy}{dx}$  is [2004]
  - a)  $\frac{1+x}{x}$
  - b)  $\frac{1}{x}$
  - c)  $\frac{1-x}{x}$
  - d)  $\frac{x}{1+x}$
- 3) The value of  $a$  for which the sum of the squares of the roots of the equation  $x^2 - (a-2)x - a - 1 = 0$  assume the least value is [2005]
  - a) 1
  - b) 0
  - c) 3
  - d) 2
- 4) If the roots of the equation  $x^2 - bx + c = 0$  be two consecutive integers, then  $b^2 - 4c$  equals to [2005]
  - a) -2
  - b) 3
  - c) 2
  - d) 1
- 5) Let  $f : R \rightarrow R$  be a differentiable function having  $f(2) = 6, f'(2) = \left(\frac{1}{48}\right)$ . Then  $\lim_{x \rightarrow 2} \int_6^{f(x)} \frac{4t^3}{x-2} dt$  equals to [2005]
  - a) 24
  - b) 36
  - c) 12
  - d) 18
- 6) The set of points where  $f(x) = \frac{x}{1+|x|}$  is differentiable is [2006]
  - a)  $(-\infty, 0) \cup (0, \infty)$
  - b)  $(-\infty, -1) \cup (-1, \infty)$
  - c)  $(-\infty, \infty)$
  - d)  $0, \infty$
- 7) If  $x^m \cdot y^n = x + y^{m+n}$ , then  $\frac{dy}{dx}$  is [2006]
  - a)  $\frac{y}{x}$
  - b)  $\frac{x+y}{xy}$
  - c)  $xy$
  - d)  $\frac{x}{y}$
- 8) Let  $y$  be an implicit function of  $x$  defined by  $x^{2x} - 2x^x \cot y - 1 = 0$ . Then  $y'(1)$  equals [2009]
  - a) 1
  - b)  $\log 2$
  - c)  $-\log 2$
  - d) -1
- 9) Let  $f : (-1, 1) \rightarrow R$  be a differentiable function with  $f(0) = -1$  and  $f'(0) = 1$ . Let  $g(x) = [f(2f(x) + 2)]^2$ . Then  $g'(0) =$  [2010]
  - a) -4
  - b) 0
  - c) -2
  - d) 4
- 10)  $\frac{d^2x}{dy^2}$  equals: [JEE M 2013]
  - a)  $-\left(\frac{d^2y}{dx^2}\right)^{-1} \left(\frac{dy}{dx}\right)^{-3}$
  - b)  $\left(\frac{d^2y}{dx^2}\right) \left(\frac{dy}{dx}\right)^{-2}$
  - c)  $-\left(\frac{d^2y}{dx^2}\right) \left(\frac{dy}{dx}\right)^{-3}$
  - d)  $\left(\frac{d^2y}{dx^2}\right)^{-1}$
- 11) If  $y = \sec(\tan^{-1} x)$ , then  $\frac{dy}{dx}$  at  $x=1$  is equal to: [JEE M 2013]
  - a)  $\frac{1}{\sqrt{2}}$
  - b)  $\frac{1}{2}$
  - c) 1
  - d)  $\sqrt{2}$
- 12) If  $g$  is the inverse of a function  $f$  and  $f'(x) = \frac{1}{1+x^3}$ , then  $g'(x)$  is equal to: [JEE M 2014]
  - a)  $\frac{1}{1+(g(x))^5}$
  - b)  $1+(g(x))$
  - c)  $1+x^5$
  - d)  $5x^4$
- 13) If  $x=-1$  and  $x=2$  are extreme points of  $f(x) = \alpha \log |x| + \beta x^2 + x$  then [JEE M 2014]

a)  $\alpha = 2, \beta = -\frac{1}{2}$

b)  $\alpha = 2, \beta = \frac{1}{2}$

c)  $\alpha = -6, \beta = \frac{1}{2}$

d)  $\alpha = -6, \beta = -\frac{1}{2}$

- 14) If for  $x \in (0, \frac{1}{4})$ , the derivative of  $\tan^{-1}\left(\frac{6x\sqrt{x}}{1-9x^3}\right)$  is  $\sqrt{x}g(x)$ , then  $g(x)$  equals: [JEE M 2017]

a)  $\frac{3}{1+9x^3}$

b)  $\frac{9}{1+9x^3}$

c)  $\frac{3x\sqrt{x}}{1-9x^3}$

d)  $\frac{3x}{1-9x^3}$