

Assignment-1

ee24btech11064 - Harshil Rathan

4. Let f be a function defined on R (the set of all real numbers) such that $f'(x) = 2010(x - 2009)(x - 2010)^2(x - 2011)^3(x - 2012)^4$ for all $x \in R$

If g is a function defined on R with values in the interval $(0, \infty)$ such that

$$f(x) = \ln g(x), \text{ for all } x \in R$$

then the number of points in R at which g has a local maximum is (2010)

container is minimum when the inner radius of the container is 10mm, then the value of $\frac{V}{250\pi}$ is (JEEAdv.2015)

5. let $f: IR \rightarrow IR$ be defined as $f(x) = |x| + |x^2 - 1|$. The total number of points at which f attains either a local maximum or a local minimum is (2012)

6. Let $p(x)$ be a real polynomial of least degree which has a local maximum at $x=1$ and local minimum at $x=3$. If $p(1)=6$ and $p(3)=2$, then $p'(0)$ is (2012)

7. A vertical line passing through the point $(h, 0)$ intersects the ellipse $\frac{x^2}{4} + \frac{y^2}{3} = 1$ at the points P and Q . Let the tangents to the ellipse at P and Q meet at the point R . If $\Delta(h) = \text{area of the triangle } PQR$, $\Delta_1 = \max_{1/2 \leq h \leq 1} \Delta(h)$ and $\Delta_2 = \min_{1/2 \leq h \leq 1} \Delta(h)$, then $\frac{8}{\sqrt{5}}\Delta_1 - 8\Delta_2 =$ (JEEAdv.2013)

8. The slope of the tangent to the curve $(y - x^5)^2 = x(1 + x^2)^2$ at the point $(1, 3)$ is (JEEAdv.2014)

9. A cylindrical container is to be made from a certain solid material with the following constraints: It has a fixed inner volume of $V \text{ mm}^3$, has a 2mm thick solid wall and is open at the top. The bottom of the container is a solid circular disc of thickness 2mm and is of radius equal to the outer radius of the container.

If the volume of the material used to make the