

MAC2311 Calculus 1

<http://www.imathesis.com/mac2311.html>

Homework question

3.3.59

The curve $y = ax^2 + bx + c$ passes through the point $(1, 8)$ and is tangent to the line $y = 6x$ at the origin. Find a , b and c .

Solution:

The curve contains point $(1, 8)$; therefore, $8 = a(1)^2 + b(1) + c$ or $a + b + c = 8$.

We also know that the curve is tangential to $y = 6x$ at the origin; that implies that the curve goes through the origin; consequently, $0 = a(0)^2 + b(0) + c$ or $c = 0$. Since *the derivative at a point is equal to the slope of the tangent line at that point* then, at $(0, 0)$ the derivative is equal to 6, -that is the slope of the tangent line at that point (it is given, tangent line $y = 6x$).

Take the derivative, $2ax + b = 6$ at the origin, where $x = 0$ implies that $b = 6$; and since $a + b + c = 8$, $a = 2$.

Answer: $a = 2$; $b = 6$ and $c = 0$.