Exercise 4

For the following exercises, points $P(1,1)$ and $Q(x,y)$ are on the graph of the function $f(x)=x^3$.

Complete the following table with the appropriate values: y-coordinate of Q, the point $Q(x,y)$, and the slope of the secant line passing through points P and Q. Round your answer to eight significant digits.

x	y	$Q\,(x,y)$	m_{sec}
1.1	a.	e.	i.
1.01	b.	f.	j.
1.001	c.	g.	k.
1.0001	d.	h.	l.

Solution

If $x=1.1$, then $y=(1.1)^3=1.331$, which means $Q(1.1,1.331)$ and

$$m_{\text{sec}}=\frac{1.331-1}{1.1-1}=3.31.$$

If $x=1.01$, then $y=(1.01)^3=1.030301$, which means $Q(1.01,1.030301)$ and

$$m_{\text{sec}}=\frac{1.030301-1}{1.01-1}=3.0301.$$

If $x=1.001$, then $y=(1.001)^3=1.003003001$, which means $Q(1.001,1.003003001)$ and

$$m_{\text{sec}}=\frac{1.003003001-1}{1.001-1}=3.003001.$$

If $x=1.0001$, then $y=(1.0001)^3=1.000300030001$, which means $Q(1.0001,1.000300030001)$ and

$$m_{\text{sec}}=\frac{1.000300030001-1}{1.0001-1}=3.00030001.$$

For $f(x)=x^3$, the slope of the secant line passing through P and Q gets closer and closer to 3 as x gets closer and closer to 1.