1.7 – The Intermediate Value Theorem (IVT)

IVT

Suppose that *f* is continuous on the closed interval $[a, b]$ and that *M* is between $f(a)$ and $f(b)$. Then, there exists some value *c* on the open interval (a, b) such that $f(c) = M$.

1. Consider the function $g(x) = e^{-4x}$. Show that there exists some value c $(-1, 2)$ such that $g(c) = 1$.

2. Show that the function $y = 3x^3 - 4x - 8$ has a zero on the interval $(0, 2)$.

3. Suppose the function *h*, as given in the table below, is continuous for all real numbers.

x	0	2	4	6	8	10
$h(x)$	–8	0	1	1	3	–1

Suppose $f(x) = 4 - 2h(x)$. Show that there must be a value *n* on $4 < n < 10$ such that $f(n) = 5$.