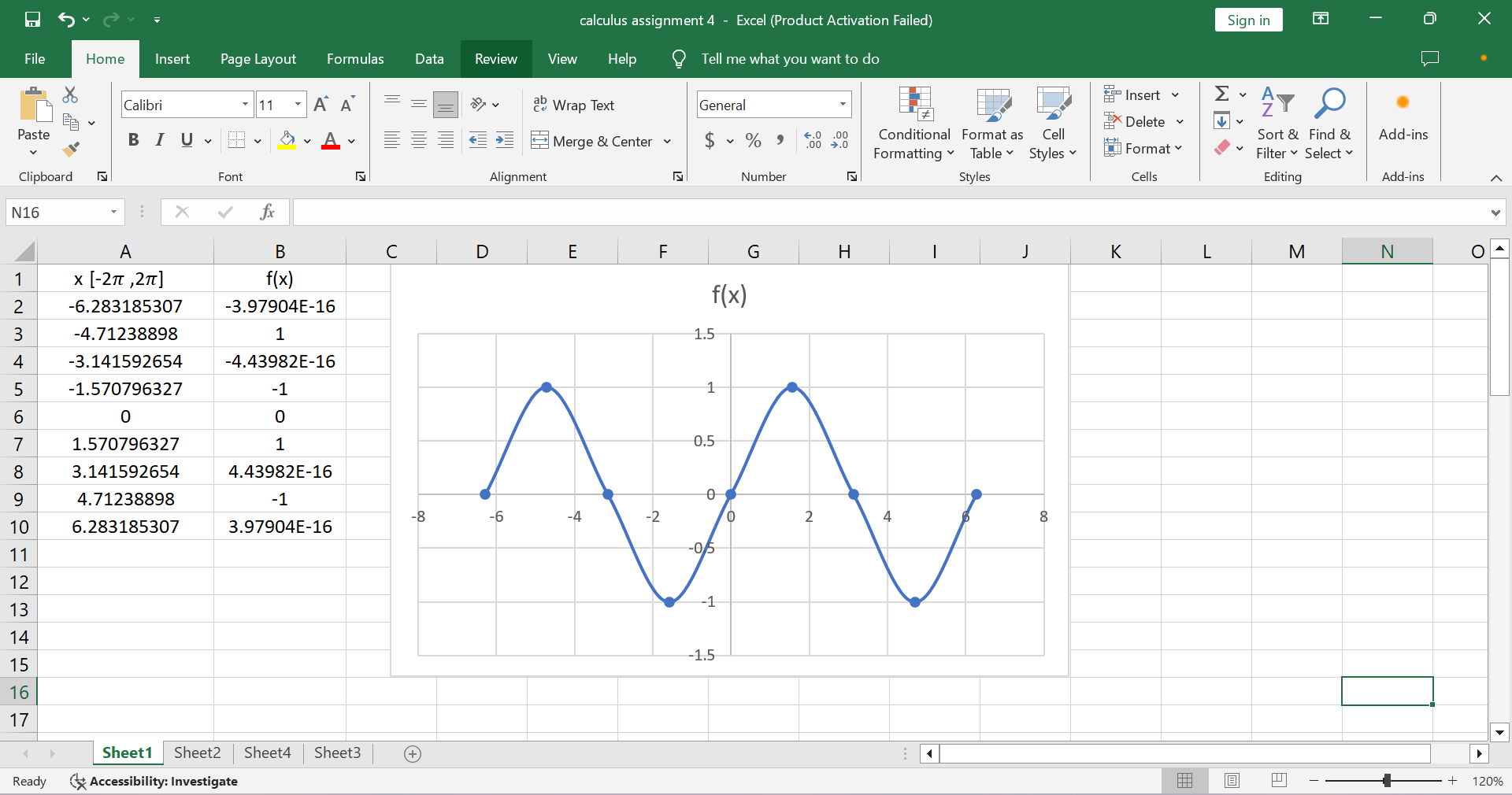
Q1.

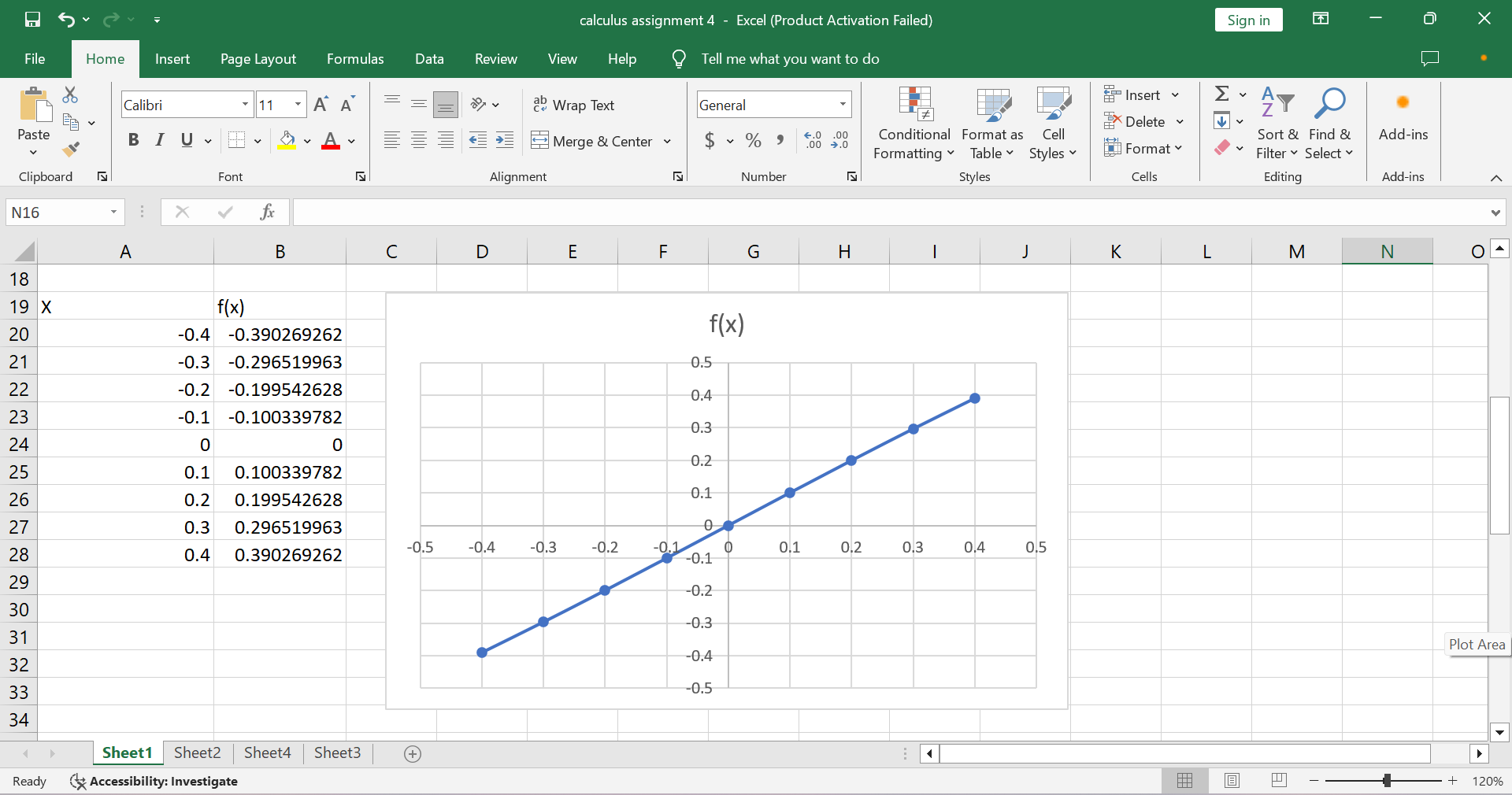
f(x)=sin(x)−sin(1000x)

(a)



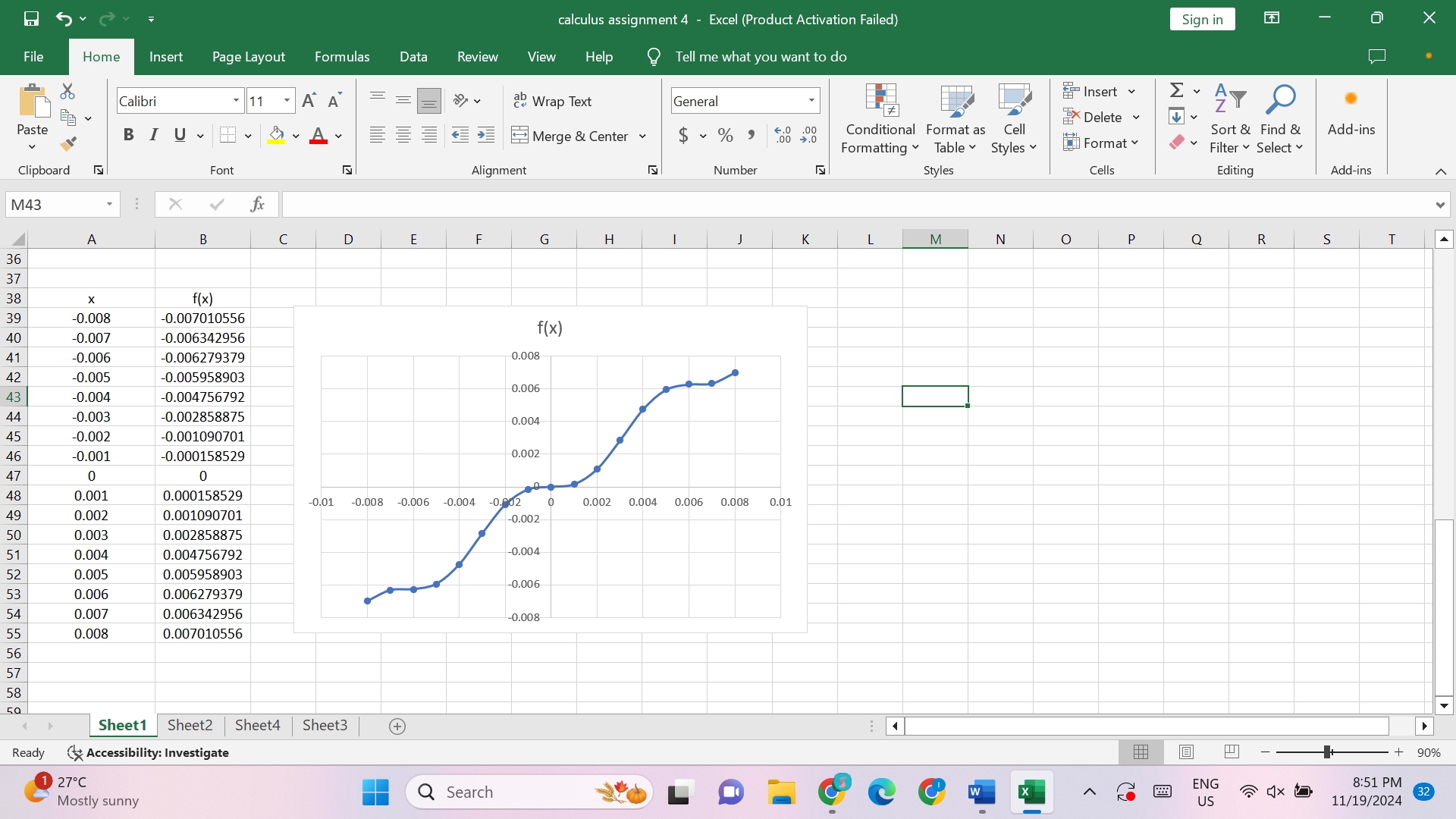
The slope of the graph at the origin appears to be 1.

(b)



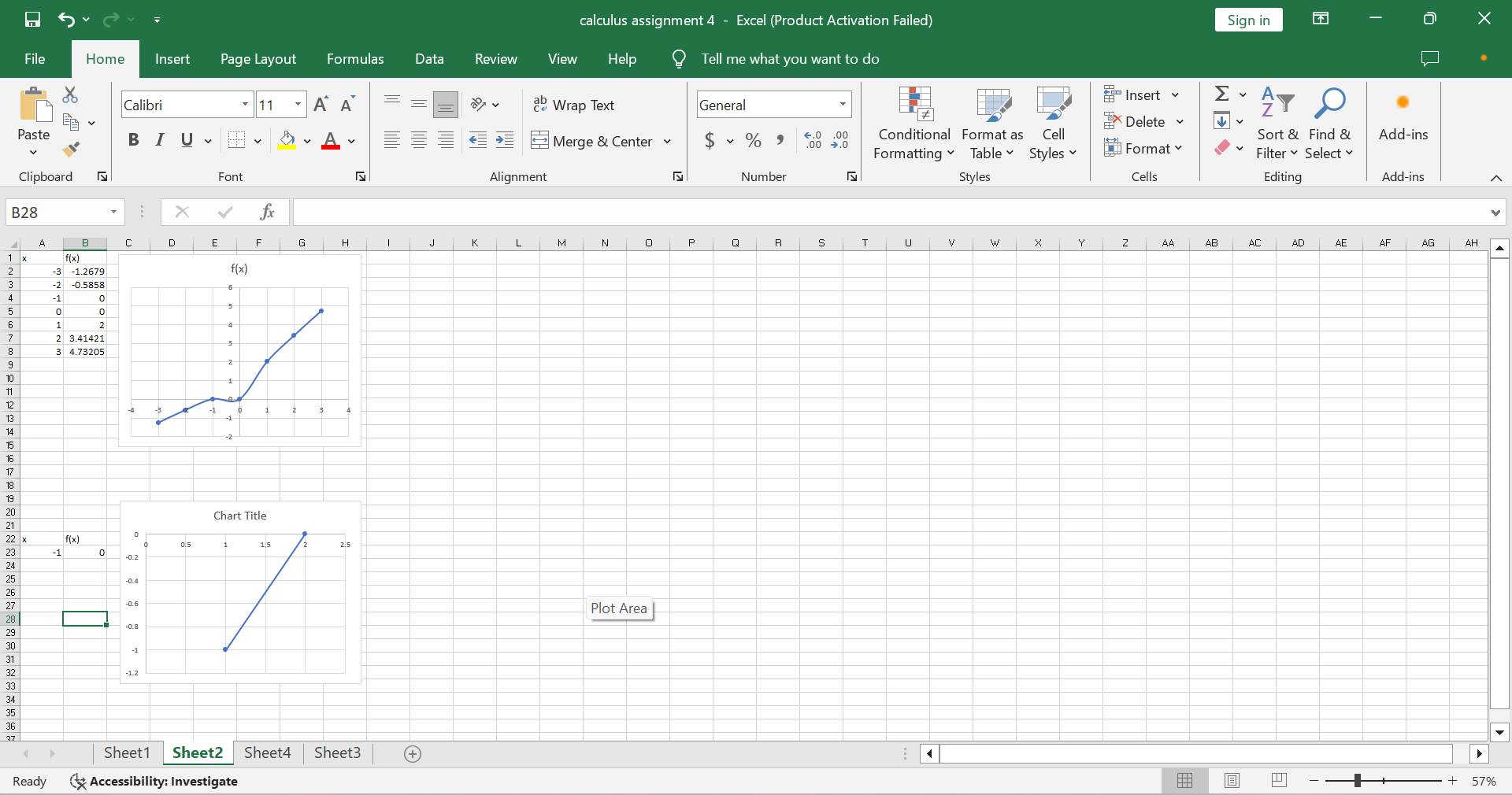
The slope of the graph at the origin appears to be 1: f ′ (0) = 1.

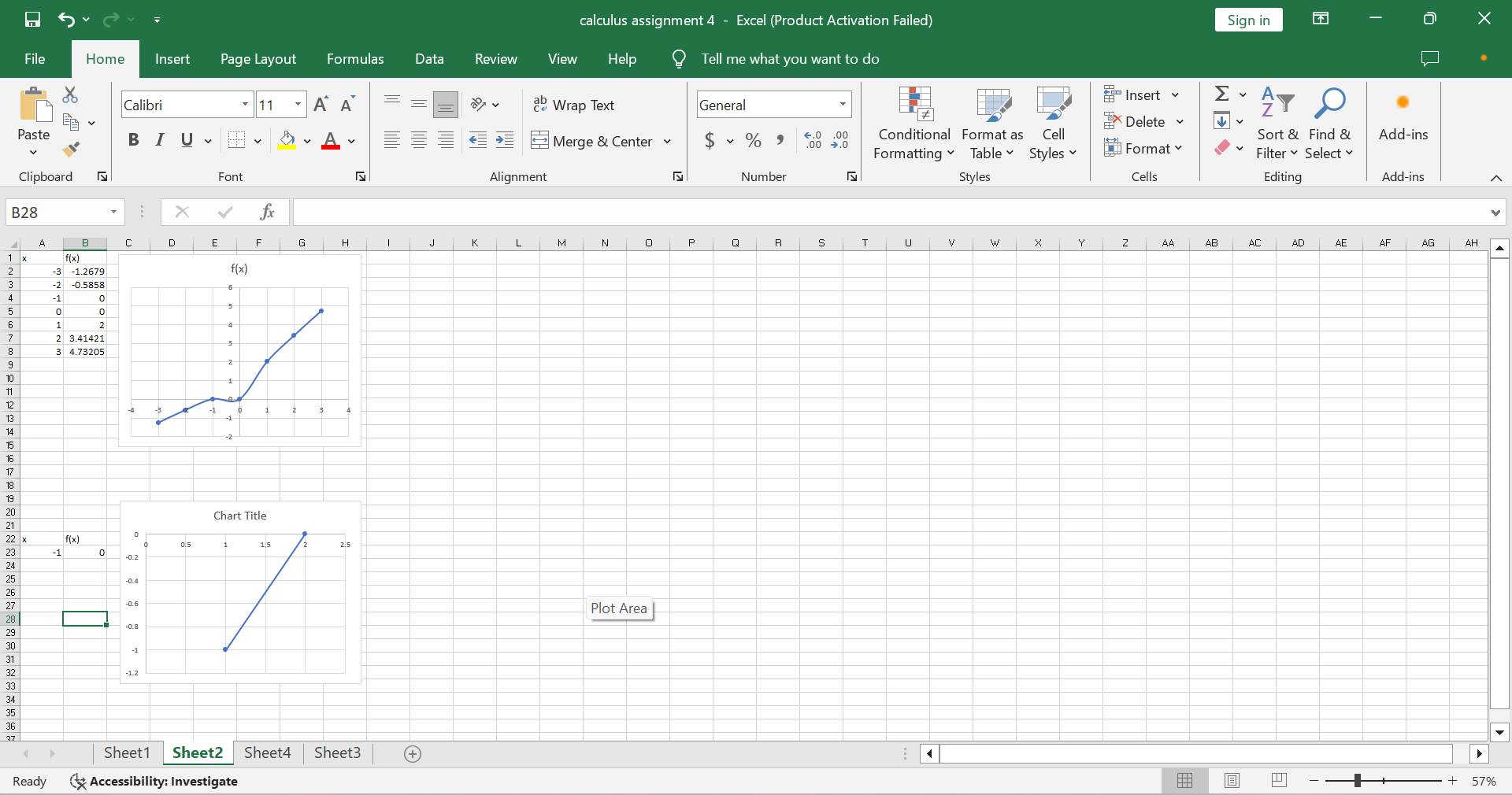
(c)



The slope of the graph at the origin is zero: f ′ (0) = 0.

Q2.





Zoom in towards the point (−1, 0). Notice that the graph is a straight line.

At the point (−1, 0), the graph is smooth and linear and the function is differentiable.

Q3.

f’-(a)=

f’+(a)=

(a)

f’-(4) =

=

=

=

= -1

f’+(4) =

=

=

=

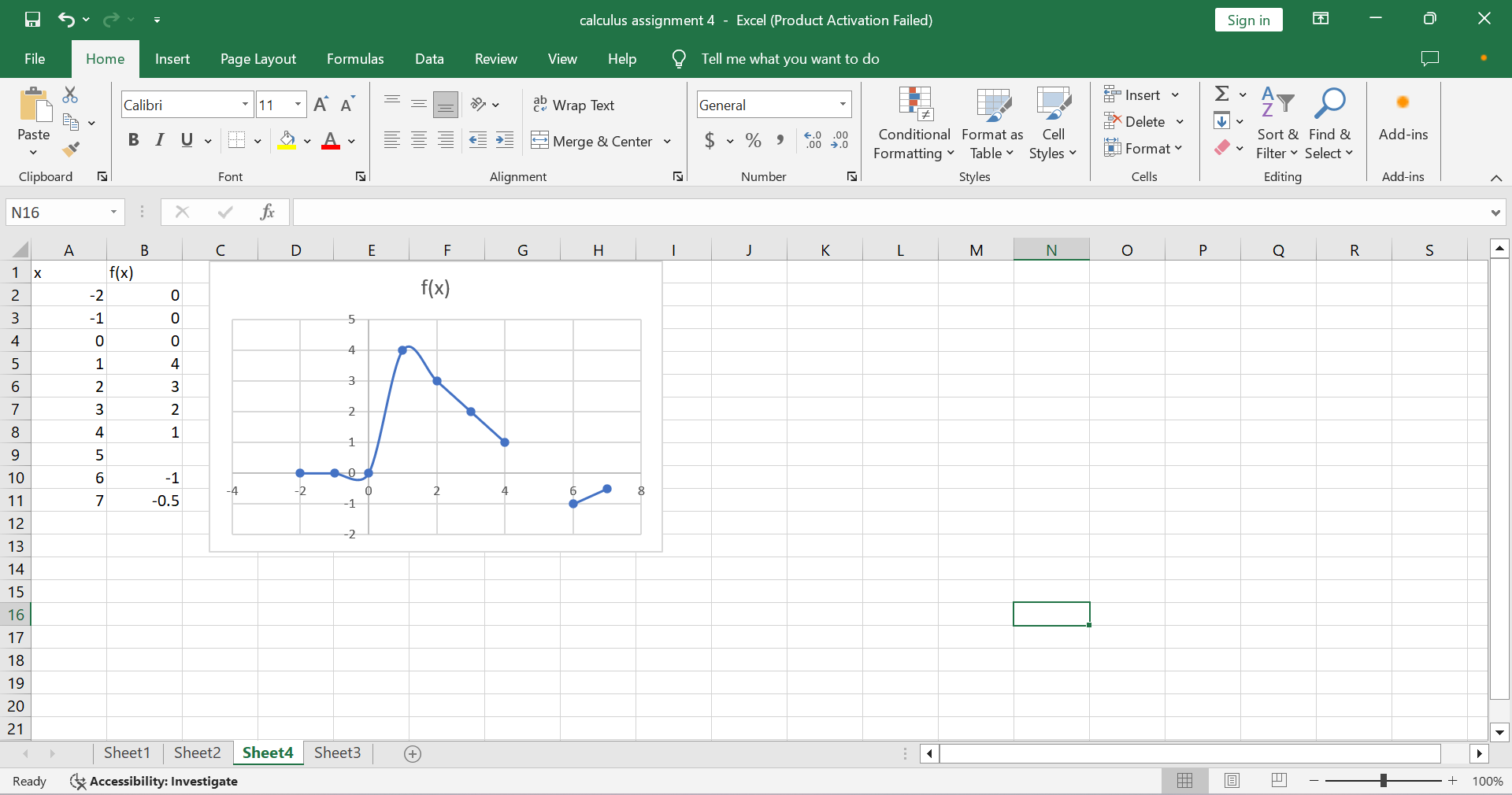
=

=

=

= 1

(b)



(c) f is discontinuous at x=5

(d) f is not differentiable at x=5.

Q4.

g(x)= x f(x)

g’(x) =

g(x+h) = (x+h) f (x+h)

g(x) = x f(x)

g’(x) =

(x+h) f (x+h) = x f (x+h) + h f (x+h)

So,

g’(x) =

g’(x) =

= f’(x)

f(x+h) = f(x)

g’(x) = xf’(x) + f(x)

Q5.

By Boyle’s Law,

P ∝

P =k

50 kPa =

k=5.3 kPa m3

P=

V=

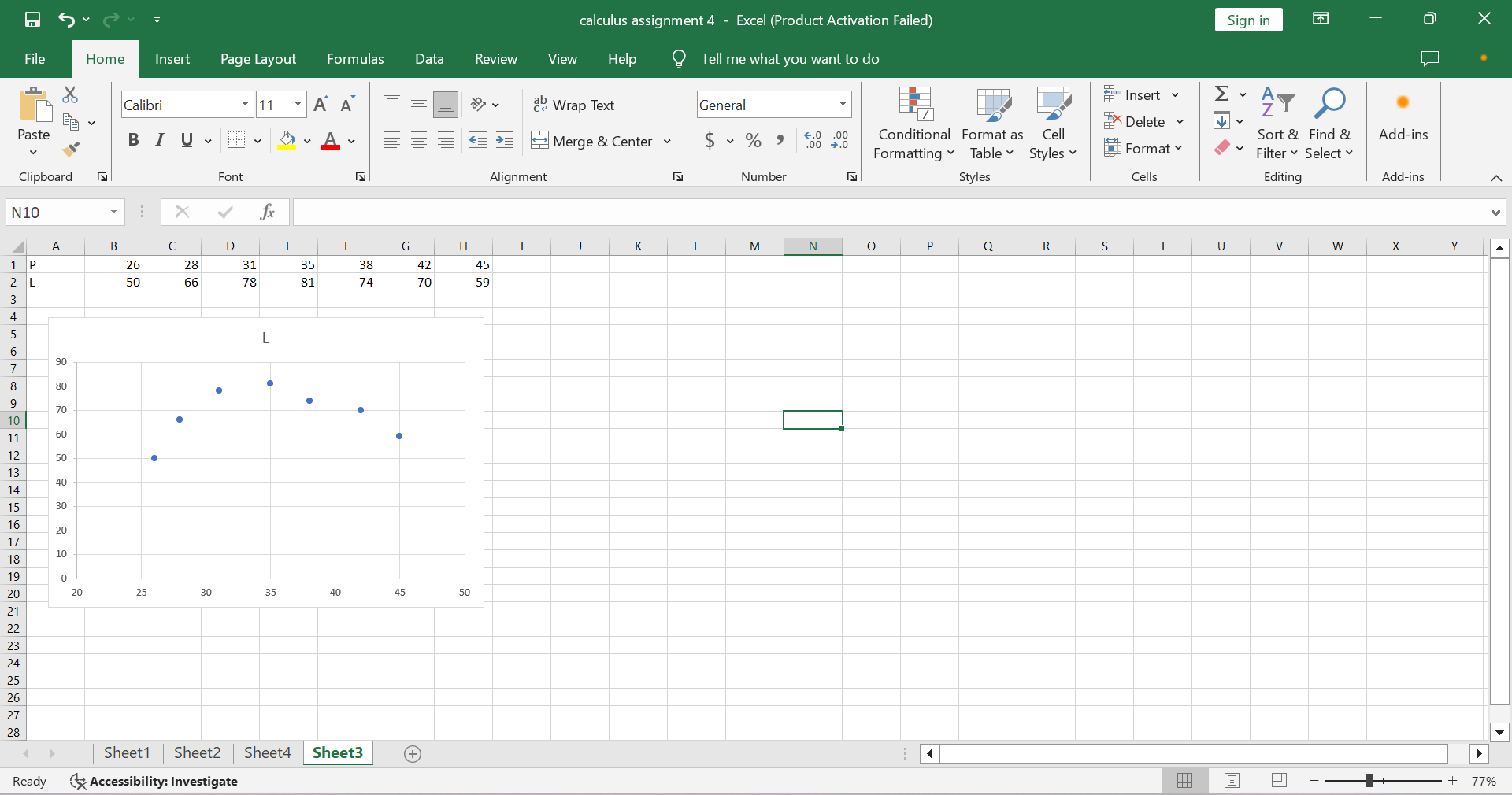
= ()=5.3kPa (P-1)= -(5.3kPa)P-2

P=50 kPa

= () = - (5.3 kPa) )(50)-2 m3

P has units of kPa, dV /dP has units of m3/kPa.

Q6.



As a quadratic function,

L(P) = aP2+bP+c

L(P) = - 273.55 +19.749P – 0.27543P2

.= (-273.55+19.749P – 0.27543P2)

= (-273.55)+(19.749P) – (0.27543P2)

= (-273.55)+19.749(P) –0.27543 (P2)

= 19.749-0.55086P

When P=30,

.=19.749\_0.55086(30)= 3.2229

When P=40,

.=19.749\_0.55086(40)= -2.2857

The units of are kilomiles over pounds per square inch.

[] =

If is positive, then the tire life increases with increasing pressure, and if dL/dP is negative, then the tire life decreases with increasing pressure.