Graded Assignment - 8

**The due date for submitting this assignment has passed.**

**Due on 2025-07-30, 23:59 IST.**

**You may submit any number of times before the due date. The final submission will be considered for grading.**

**Note: This assignment will be evaluated after the deadline passes. You will get your score 48 hrs after the deadline. Until then the score will be shown as Zero.**

***1 point***

Match the given functions in Column A with the equations of their tangents at the origin (0,0)(0,0) in column B and the plotted graphs and the tangents in Column C, given in Table M2W2G1.  
  
A table of equations with graphs and diagrams

AI-generated content may be incorrect.

ii) →→ a) →→ 1.

i) →→ b) →→ 3.

iii) →→ b) →→ 1.

iii) →→ c) →→ 2.

i) →→ a) →→ 1.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

ii) →→ a) →→ 1.

i) →→ b) →→ 3.

iii) →→ c) →→ 2.

***1 point***

Consider the following two functions f(x)*f*(*x*) and g(x)*g*(*x*).  
f(x)={x3−9xx(x−3)if x≠0,33if x=00if x=3*f*(*x*)=⎩⎨⎧​*x*(*x*−3)*x*3−9*x*​if *x*=0,33if *x*=00if *x*=3​  
  
g(x)={∣x∣if x≤2⌊x⌋if x>2*g*(*x*)={∣*x*∣⌊*x*⌋​if *x*≤2if *x*>2​  
  
Choose the set of correct options.

f(x)*f*(*x*) is discontinuous at both x=0*x*=0 and x=3*x*=3.

f(x)*f*(*x*) is discontinuous only at x=0*x*=0.

f(x)*f*(*x*) is discontinuous only at x=3*x*=3.

g(x)*g*(*x*) is discontinuous at x=2*x*=2.

g(x)*g*(*x*) is discontinuous at x=3*x*=3.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

f(x)*f*(*x*) is discontinuous only at x=3*x*=3.

g(x)*g*(*x*) is discontinuous at x=3*x*=3.

***1 point***

Consider the graphs given below:  
  
A group of graphs of a function

AI-generated content may be incorrect.  
  
Choose the set of correct options from the below.

Curve 1 is both continuous and differentiable at the origin.

Curve 2 is continuous but not differentiable at the origin.

Curve 2 has derivative 0 at x=0*x*=0.

Curve 3 is continuous but not differentiable at the origin.

Curve 4 is not differentiable anywhere.

Curve 4 has derivative 0 at x=0*x*=0.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

Curve 1 is both continuous and differentiable at the origin.

Curve 2 has derivative 0 at x=0*x*=0.

Curve 3 is continuous but not differentiable at the origin.

***1 point***

Choose the set of correct options considering the function given below:  
  
f(x)={sin xxif x≠0,1if x=0*f*(*x*)={*xsin* *x*​1​if *x*=0,if *x*=0​

f(x)*f*(*x*) is not continuous at x=0*x*=0.

f(x)*f*(*x*) is continuous at x=0*x*=0.

f(x)*f*(*x*) is not differentiable at x=0*x*=0.

f(x)*f*(*x*) is differentiable at x=0*x*=0.

The derivative of f(x)*f*(*x*) at x=0*x*=0 (if exists) is 00.

The derivative of f(x)*f*(*x*) at x=0*x*=0 (if exists) is 11.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

f(x)*f*(*x*) is continuous at x=0*x*=0.

f(x)*f*(*x*) is differentiable at x=0*x*=0.

The derivative of f(x)*f*(*x*) at x=0*x*=0 (if exists) is 00.

***1 point***

Let f*f* be a polynomial of degree 5, which is given by  
  
f(x)=a5x5+a4x4+a3x3+a2x2+a1x+a0.*f*(*x*)=*a*5​*x*5+*a*4​*x*4+*a*3​*x*3+*a*2​*x*2+*a*1​*x*+*a*0​.  
  
Let f′(b)*f*′(*b*) denote the derivative of f*f* at x=b*x*=*b*. Choose the set of correct options.

a1=f′(0)*a*1​=*f*′(0)

5a5+3a3=12(f′(1)+f′(−1)−2f′(0))5*a*5​+3*a*3​=21​(*f*′(1)+*f*′(−1)−2*f*′(0))

4a4+2a2=12(f′(1)−f′(−1))4*a*4​+2*a*2​=21​(*f*′(1)−*f*′(−1))

None of the above.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

a1=f′(0)*a*1​=*f*′(0)

5a5+3a3=12(f′(1)+f′(−1)−2f′(0))5*a*5​+3*a*3​=21​(*f*′(1)+*f*′(−1)−2*f*′(0))

4a4+2a2=12(f′(1)−f′(−1))4*a*4​+2*a*2​=21​(*f*′(1)−*f*′(−1))

Let f*f* be a differentiable function at x=3*x*=3. The tangent line to the graph of the function f*f* at the point (3,0)(3,0), passes through the point (5,4)(5,4). What will be the value of f′(3)*f*′(3)?

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 2

***1 point***

Let f*f* and g*g* be two functions which are differentiable at each x∈R*x*∈R. Suppose that, f(x)=g(x2+5x)*f*(*x*)=*g*(*x*2+5*x*), and f′(0)=10*f*′(0)=10. Find the value of g′(0)*g*′(0).

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 2

***1 point***

Consider a function f:R→R*f*:R→R defined as f(x)={sin⁡6x+Asin⁡x12x3if x≠0,Bif x=0.*f*(*x*)={12*x*3sin6*x*+*A*sin*x*​*B*​if *x*=0,if *x*=0.​ If f(x)*f*(*x*) is continuous at x=0*x*=0 , then find the value of 72B−A72*B*−*A*

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) -204

***1 point***

The distance (in meters) traveled by a car after t*t* minutes is given by the function d(t)=g(7t3+3t2+8t+7)*d*(*t*)=*g*(7*t*3+3*t*2+8*t*+7) , where g*g* is a differentiable function with domain RR . Find the instantaneous speed of the car after 5 min, where g′(997)=2*g*′(997)=2

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 1126

***1 point***

Consider the following two functions  
  
                                                        p:R→R*p*:R→R   
  
p(t)={5e(t−5)−5t−5if 0≤t<5,5t=55(t2−25)1ln⁡(t−5)if t>5*p*(*t*)=⎩⎨⎧​*t*−55*e*(*t*−5)−5​55(*t*2−25)ln(*t*−5)1​​if 0≤*t*<5,*t*=5if *t*>5​  
  
and  
  
                                                        q:R→R*q*:R→R  
  
q(t)=∣t(t−4)(t−3)∣*q*(*t*)=∣*t*(*t*−4)(*t*−3)∣ and the following statements (a function is said to be continuous (respectively differentiable) if it is continuous (respectively differentiable) at all the points in the domain of the function).  
   
  
Statement P:**Statement P:** Both the functions p(t)*p*(*t*) and q(t)*q*(*t*) are continuous.  
Statement Q:**Statement Q:** Both the functions p(t)*p*(*t*) and q(t)*q*(*t*) are not differentiable.  
Statement R:**Statement R:** p(t)*p*(*t*) is continuous, q(t)*q*(*t*) is differentiable.  
Statement S:**Statement S:** q(t)*q*(*t*) is continuous, p(t)*p*(*t*) is not differentiable.  
Statement T:**Statement T:** Neither p(t)*p*(*t*) nor q(t)*q*(*t*) is continuous.  
   
Find the number of correct statements.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 2

***1 point***

Consider the following function  
  
                       p:R→R*p*:R→R   
  
       p(t)={2e(t−2)−2t−2if 0≤t<2,2t=22(t2−4)1ln⁡(t−2)if t>2*p*(*t*)=⎩⎨⎧​*t*−22*e*(*t*−2)−2​22(*t*2−4)ln(*t*−2)1​​if 0≤*t*<2,*t*=2if *t*>2​  
  
If linear function Lp(t)=At+B*Lp*​(*t*)=*At*+*B* denotes the best linear approximation of the function p(t)*p*(*t*) at the point t=1*t*=1, find the value of −2e−1−1(A+B)*e*−1−1−2​(*A*+*B*)

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 4

***1 point***

Consider the following function  
                                q:R→Rq(t)=∣t(t−2)(t−4)∣.*q*:R→R*q*(*t*)=∣*t*(*t*−2)(*t*−4)∣.  
  
If m*m* is slope of the tangent of the function q(t)*q*(*t*) at point t=32*t*=23​, find the value m−274*m*−427​

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) -10

***1 point***

The population of a bacteria culture of type A in laboratory conditions is known to be a function of time of the form  
  
p:R→R*p*:R→R  
p(t)={t3−27t−3if 0≤t<3,27t=31e81(t−3)(e27t−e81)if t>3*p*(*t*)=⎩⎨⎧​*t*−3*t*3−27​27*e*81(*t*−3)1​(*e*27*t*−*e*81)​if 0≤*t*<3,*t*=3if *t*>3​  
where p(t)*p*(*t*) represents the population (in lakhs) and t*t* represents the time (in minutes). The population of a bacteria culture of type B in laboratory conditions is known to be a function of time of the form  
q:R→R*q*:R→R  
q(t)={(5t−9)1t−2if 0≤t<2,e4t=2et+2−e4t−2if t>2*q*(*t*)=⎩⎨⎧​(5*t*−9)*t*−21​*e*4*t*−2*et*+2−*e*4​​if 0≤*t*<2,*t*=2if *t*>2​  
where q(t)*q*(*t*) represents the population (in lakhs) and t*t* represents the time (in minutes).  
  
Using the information above, answer questions 13,14 and 15.

Consider the following statements (a function is said to be continuous if it is continuous at all the points in the domain of the function).  
  
Statement P:**Statement P:** Both the functions p(t)*p*(*t*) and q(t)*q*(*t*) are continuous.  
Statement Q:**Statement Q:** p(t)*p*(*t*) is continuous, but q(t)*q*(*t*) is not.  
Statement R:**Statement R:** q(t)*q*(*t*) is continuous, but p(t)*p*(*t*) is not.  
Statement S:**Statement S:** Neither p(t)*p*(*t*) nor q(t)*q*(*t*) is continuous.  
  
 Find the number of the correct statements.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 1

***1 point***

If Lp(t)=At+B*Lp*​(*t*)=*At*+*B* denotes the best linear approximation of the function p(t)*p*(*t*) at the point t=1*t*=1, then find the value of 2A+B2*A*+*B*.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 18

***1 point***

If Lp(t)=e4(At+B)+Ce5*Lp*​(*t*)=*e*4(*At*+*B*)+*Ce*5 denotes the best linear approximation of the function q(t)*q*(*t*) at the point t=3*t*=3, then find the value of A+B+C*A*+*B*+*C*.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) -2

***1 point***

***1 point***

Consider the following function:  
  
f(x)={x(x+1)(x+2)x≥11x−5x<0*f*(*x*)={(*x*+1)(*x*+2)*x*​*x*−51​​*x*≥1*x*<0​  
  
Which of the following options is (are) correct?

limx→−2+f(x)=∞*limx*→−2+​*f*(*x*)=∞

The function f*f* is continuous.

limx→5+f(x)=limx→5−f(x)=542*limx*→5+​*f*(*x*)=*limx*→5−​*f*(*x*)=425​

At x=1*x*=1, the function f*f* is discontinuous.

No, the answer is incorrect.  
Score: 0

Accepted Answers:

limx→5+f(x)=limx→5−f(x)=542*limx*→5+​*f*(*x*)=*limx*→5−​*f*(*x*)=425​

At x=1*x*=1, the function f*f* is discontinuous.

Suppose f*f* is a real valued function defined on R*R*. Let f(x+y)=f(x)f(y)*f*(*x*+*y*)=*f*(*x*)*f*(*y*) for all x,y∈R*x*,*y*∈*R* and f(1)=7*f*(1)=7 and f′(0)=2*f*′(0)=2.  
  
Based on the above data, answer the given subquestions (17 and 18).

What is the value of f(0)*f*(0)?

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 1

***1 point***

What is the value of f′(1)*f*′(1)?

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 14

***1 point***

Consider a function f*f* defined as,  
  
f(x)={3mx+nx<1,11x=1,5mx+2nx>1.*f*(*x*)=⎩⎨⎧​3*mx*+*n*115*mx*+2*n*​*x*<1,*x*=1,*x*>1.​  
  
If f*f* is continuous at x=1*x*=1, then the value of m+n*m*+*n* is

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 5

***1 point***

An LED manufacturer determines that in order to sell x number of LEDs, the price per LED (in thousands) must be f(x)=1000−x*f*(*x*)=1000−*x*, if x≤800*x*≤800, and the manufacturer also determines that the total cost (in thousands) of producing x*x* number of LEDs is  
  
g(x)={30000+300xif x≤400,100x+110000if 400<x≤800.*g*(*x*)={30000+300*x*100*x*+110000​*if* *x*≤400,*if* 400<*x*≤800.​  
  
Suppose the company can produce a maximum of 400 LEDs due to a production issue. The number of LEDs the company should produce and sell in order to maximize profit is

No, the answer is incorrect.  
Score: 0

Accepted Answers:

(Type: Numeric) 350