AQ8.2: Activity Questions 2 - Not Graded

**This assignment will not be graded and is only for practice.**

**Level 1:**

***1 point***

Choose the set of correct options.

If lim⁡h→0f(a+h)−f(a)h*h*→0lim​*hf*(*a*+*h*)−*f*(*a*)​ exists, then f*f* is differentiable at a*a*.

A function f*f* may be differentiable at a point a*a*, even if it is not continuous at a*a*.

If a function is differentiable at a point a*a*, then it must be continuous at a*a*.

There can exist some continuous functions which are not differentiable at some points in the domain.

***1 point***

Which of the following options showing step wise solution to check whether a function is differentiable or not are true?

Checking whether a constant function f(x)=c*f*(*x*)=*c* is differentiable at any real number a*a* or not: lim⁡h→0f(a+h)−f(a)h=lim⁡h→0c+h−ch=lim⁡h→0hh=1*h*→0lim​*hf*(*a*+*h*)−*f*(*a*)​=*h*→0lim​*hc*+*h*−*c*​=*h*→0lim​*hh*​=1.

Checking whether f(x)=x−c*f*(*x*)=*x*−*c* is differentiable at a*a* for some real number a*a*, or not: lim⁡h→0f(a+h)−f(a)h=lim⁡h→0(a+h−c)−(a−c)h=lim⁡h→0hh=1*h*→0lim​*hf*(*a*+*h*)−*f*(*a*)​=*h*→0lim​*h*(*a*+*h*−*c*)−(*a*−*c*)​=*h*→0lim​*hh*​=1.

Checking whether f(x)=x2*f*(*x*)=*x*2 is differentiable at any real number a*a* or not: lim⁡h→0f(a+h)−f(a)h=lim⁡h→0(a+h)2−a2h=lim⁡h→02ah+h2h=0*h*→0lim​*hf*(*a*+*h*)−*f*(*a*)​=*h*→0lim​*h*(*a*+*h*)2−*a*2​=*h*→0lim​*h*2*ah*+*h*2​=0.

Checking whether f(x)=ex*f*(*x*)=*ex* is differentiable at any real number a*a* or not: lim⁡h→0f(a+h)−f(a)h=lim⁡h→0ea+h−eah=lim⁡h→0ea(eh−1)h=ealim⁡h→0eh−1h=ea.1=ea*h*→0lim​*hf*(*a*+*h*)−*f*(*a*)​=*h*→0lim​*hea*+*h*−*ea*​=*h*→0lim​*hea*(*eh*−1)​=*eah*→0lim​*heh*−1​=*ea*.1=*ea*.

***1 point***

Consider the function defined as follows:  
  
  
f(x)={⌊x⌋if x≥0⌈x⌉if x<0,*f*(*x*)={⌊*x*⌋⌈*x*⌉​if *x*≥0if *x*<0,​  
  
  
Choose the set of correct options:

f*f* is differentiable at x=0*x*=0.

f*f* is differentiable at x=1*x*=1.

f*f* is differentiable at x=−1*x*=−1.

f*f* is differentiable at x=1.5*x*=1.5.

***1 point***

Consider the graphs given below:  
  
A graph of function and function of a function

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

f1*f*1​ is continuous and differentiable at each real number.

f1*f*1​ is not differentiable at 11.

f2*f*2​ is not continuous at 00.

f2*f*2​ is differentiable in the interval [1,2][1,2].

***1 point***

The following curve shown in Figure M2W2AQ2 represents the function f:R→R*f*:R→R, such that f(x)=x13*f*(*x*)=*x*31​.  
  
A graph of a function

AI-generated content may be incorrect.  
  
Which of the following options is(are) correct?

f*f* is continuous on RR.

f*f* is differentiable everywhere on RR.

f*f* is no where differentiable on RR.

f*f* is not differentiable at 00.

***1 point***

Consider the function f(x)=x∣x∣*f*(*x*)=*x*∣*x*∣. Which of the following options are correct?

f*f* is not continuous on RR.

f*f* is continuous on RR.

f*f* is continuous on RR and not differentiable at 00.

f*f* is both continuous and differentiable on RR

**Level 2:**

***1 point***

Choose the set of correct options.

There exists a function f:R→R*f*:R→R such that f*f* is not differentiable exactly on the set of natural numbers

Inverse of a differntiable function is differentiable.

Let f(x)=x2*f*(*x*)=*x*2 for x*x* rational and f(x)=0*f*(*x*)=0 for x*x* irrational. Then f*f* is differntiable at x=0*x*=0.

none of the above

***1 point***

Consider the function f(x)=∣sin x∣*f*(*x*)=∣sin *x*∣. Then f*f* is

periodic with period π*π*.

everywhere continuous and differentiable.

everywhere continuous and not differentiable at nπ*nπ*, where n∈Z*n*∈Z.

neither continuous nor differentiable at nπ*nπ*, where n∈Z*n*∈Z.

***1 point***

Consider Figure M2W2AQ3, which represents some function f*f*, to choose the correct options from the following:  
  
A graph of a function

AI-generated content may be incorrect.

There are some points in the interval [−5,5][−5,5] at which the derivative of f*f* is 00.

There are some points in the interval [−5,5][−5,5] at which f*f* is not differentiable.

f*f* is not differentiable at 00.

There are at least 22 points where the derivative of f*f* are non-zero but the same.

Define a function f*f* as follows: f(x)={kx2+lif x≤1lx2+kx+mif x>1*f*(*x*)={*kx*2+*llx*2+*kx*+*m*​if *x*≤1if *x*>1​ If f*f* is continuous and differentible at x=1*x*=1 then the value of k−2l+m*k*−2*l*+*m* is