2.1 DEFINING AVERAGE AND INSTANTANEOUS RATES OF CHANGE AT A POINT

1. The average rate of change over an interval becomes a better and better estimate as we ________________ the interval, until eventually, when we narrow the interval to 0, the ________________ rate of change will equal the ________________ rate of change.

2. Give an equivalent expression for the difference quotient.

$$\frac{f(x) - f(a)}{x - a} =$$

2.2 DEFINING THE DERIVATIVE OF A FUNCTION AND USING DERIVATIVE NOTATION

1. Give other expressions for the derivative.

2. Write an expression for instantaneous rate of change at $x = a$.

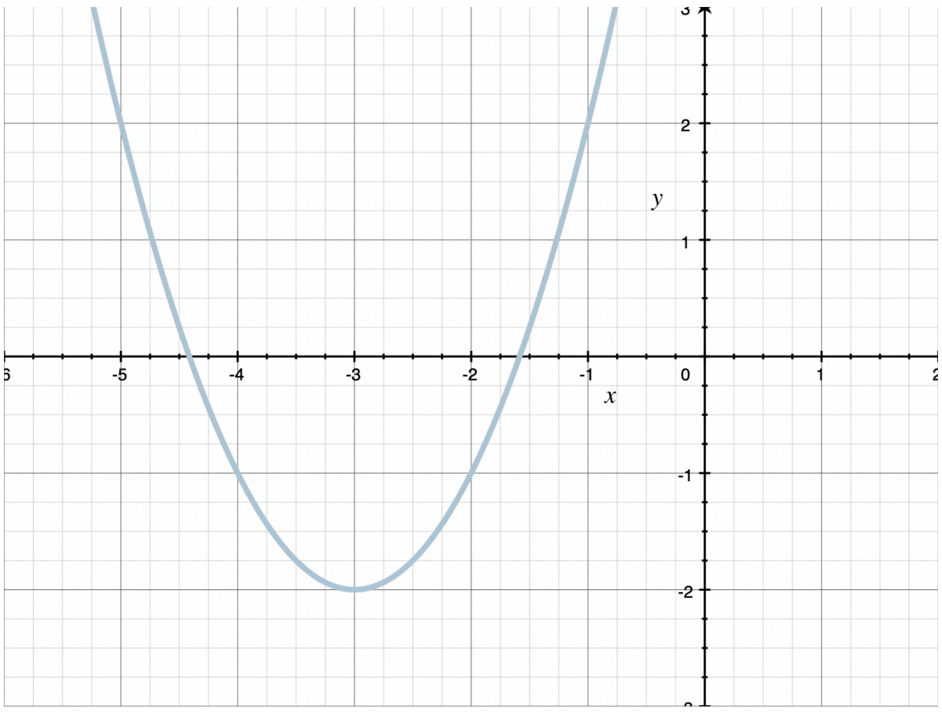
3. The ________________ at a point is equal to the ________________ of the ________________ line at that point.

2.3 ESTIMATING DERIVATIVES OF A FUNCTION AT A POINT

1. Use the table to estimate the derivative of $f(x)$ at $x = 3.5$.

x	1	2	3	4	5
f(x)	-3	4	2	5	-1

2. Use values near $x = -2$ from the graph to estimate the derivative of the function at $x = -2$.



2.4 CONNECTING DIFFERENTIABILITY AND CONTINUITY: DETERMINING WHEN DERIVATIVES DO AND DO NOT EXIST

1. If a function is ________________ at a point, then it's ________________ there, but even if a function is ________________ at a point, it's not necessarily ________________ there.

2. Name two conditions for differentiability.

2.5 APPLYING THE POWER RULE

1. Use power rule to give the derivative of each power function.

$-6x$ $\quad$ $4x^2$ $\quad$ $3x^0$ $\quad$ $-\pi x^{-3}$

2.6 DERIVATIVE RULES: CONSTANT, SUM, DIFFERENCE, AND CONSTANT MULTIPLE

1. Find the derivative of each constant.

3 $\quad$ -7 $\quad$ π^2 $\quad$ $3e$

2. Find the derivative of each polynomial.

$3x^2 - 6x + 4$

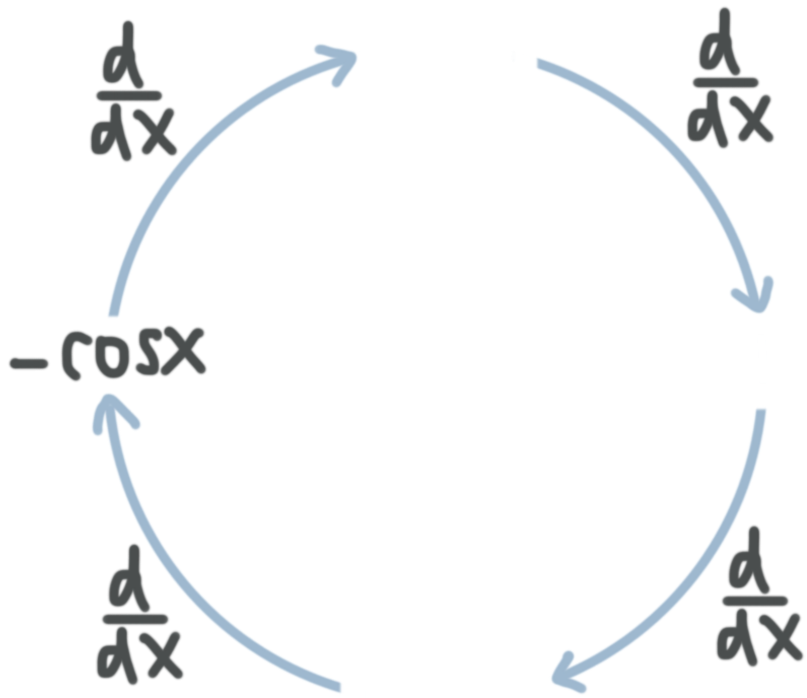
$8\pi^4 - 2x^3 + 6x^{-1}$

2.7 DERIVATIVES OF $\cos x$, $\sin x$, e^x, AND $\ln x$

1. Complete the table with the derivative of each function.

$\sin x$	e^x
$\cos x$	$\ln x$

2. Complete the circle diagram with each derivative.



2.8 THE PRODUCT RULE

1. Use product rule to differentiate each function.

$$f(x)=g(x)h(x)$$

$$f(x)=e^x\sin x$$

$$f(x)=x^{-3}\ln x$$

2. If the table gives values of the differentiable functions f and g and their derivatives at selected values of x, and if h is the function defined by $h(x)=-3g(x)+f(x)g(x)$, find $h'(2)$.

x	f(x)	f'(x)	g(x)	g'(x)
1	1	4	2	-2
2	-3	1	1	-3

2.9 THE QUOTIENT RULE

1. If $s(t) = x(t)/r(t)$, what is $s'(t)$?

2. Use quotient rule to find the derivative of each rational function.

$$f(x) = \frac{\sin x - e^x}{4x^2}$$

$$g(x) = \frac{9x \ln x}{x + 1}$$

2.10 FINDING THE DERIVATIVES OF TANGENT, COTANGENT, SECANT, AND/OR COSECANT FUNCTIONS

1. Re-order the derivatives, below, to line up with the corresponding trig functions, above.

$\sin x$	$\cos x$	$\tan x$	$\csc x$	$\sec x$	$\cot x$
$\sec^2 x$	$\sec x \tan x$	$-\csc^2 x$	$\cos x$	$-\sin x$	$-\csc x \cot x$

2. Use trig identities to prove the derivative of $\cot x$.