AP Calc AB Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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WS Assessment

Target 6:

Derivative rules

**I can:**

* Calculate derivatives of familiar functions
* Calculate derivatives of products and quotients of differentiable functions

Unit 2: Differentiation: Definition and Fundamental Properties

HW Target 6

Unit 2 Progress Check MCQ Part B

Review tangent of the line

Given function f(x) = x2 + 6. Find the tangent of this curve at point (2, 10). Sketch

Find the tangent of this curve at point (2, 1). Sketch

Given function f(x) = 2x – x2. Find the tangent of this curve at point (2, 9). Sketch

Given function y2 – x3 – 4y + 4 = 0. Find the tangent of this curve at point (1,2). Sketch. Stamp

*Differentiability (how f '(a) might fail to exist) A function will not have a derivative at a point P(a, f(a)) where the slopes of the secant lines, fail to approach a limit as x approaches a.*

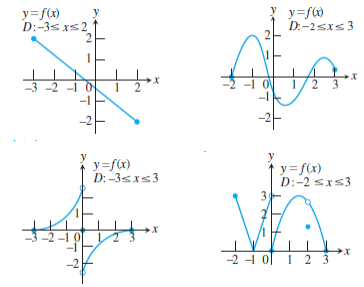
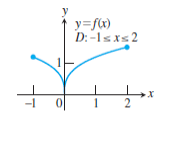
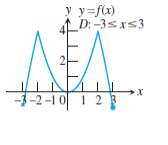
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| --- | --- | --- | --- |
| **corner**  (left limit ≠ right limit) | a **cusp**  left = -∞ ; right = ∞ | a **vertical tangent** | a **discontinuity** |
|  |  |  |  |

Find all points in the domain of f(x) = |x – 2 | + 3 where the function is not differentiable.

The graph of a function over a closed interval D is given. At what domain points does the function appear to be

(a) differentiable? (b) continuous but not differentiable? (c) neither continuous nor

differentiable?



*Take “picture” of basic derivative cheatsheet*

Find the derivative of the following function

f(x) = 3 cos x + 5 sin x f(x) =3ex + 10x3 – ln(x)

You write the function that have sin, cos, exp and log. Give and take to your partner.

Composite Function - *Chain Rule*

Composite function is obtained by “plugging” one function into another.

For example with two functions g(x) = x3 + 1 and f(x) = .

The composite function f(g(x)) = while g(f(x)) =

Chain Rule: If f and g are differentiable (derivative-able) then the composite function f(g(x)) is differentiable and (f(g(x)))' =[ f '(g(x))] [g' (x)] say [outside ' (inside) ] [ inside ' ]

By setting u = g(x), we may also write the Chain Rule as

Example: Find the derivative of y = .

As we've seen above f(x) = (outside) and g(x) = x3 + 1 (inside)

By the Chain Rule

Find the derivative of y = (x3 + 7)2 Hint f(x) = x2 (outside) g(x) = x3 +7 (inside)

Find the derivative of y = (x2 – 1)3

Find the derivative of y = sin (x5) Hint f(x) = sin(x) (outside) g(x) = x5 (inside)

Find the derivative of y = (cos x)4

y = (1 + cos 2x)2 y = cos2 (x3 + x2)

*Product Rule or the notation (uv)' = u'v + v'u*

Find the derivative of y = (x4)(cos 6x) y ' = (x4)' (cos6x) + (x4)(cos6x) '

= \_\_\_\_\_\_\_ (cos6x) + (x4) \_\_\_\_\_\_\_

Find the derivative of y = (3x – 8)7 (4x + 9)5 and simplify

Find the derivative of y = (x2 + 1) (x3 + 3) and simplify

Find the derivative of f(x) = (x3 − 4x2 )ex cos x.

Find the derivative of y = x3(5x – 2)4sin 6x

Find the derivative of y = 4sin(3t)cos(5t) both ways

Let y = uv be the product of the functions u and v. Find y'(2) if

u(2) = 3 u'(2) = -4 v(2) = 1 and v'(2) = 2

*Quotient Rule or* ***lo di hi – hi di lo all over v square***

=

Find the derivative of

Find the equation for the line tangent to the curve at the point (1, 2). Graph them

Let y = u/v be the product of the functions u and v. Find y'(2) if

u(2) = 3 u'(2) = -4 v(2) = 1 and v'(2) = 2

The reaction of the body to a dose of medicine can often be represent by an equation of the form

where C is a positive constant and M is the amount of medicine

absorbed in the blood.

If the reaction is a change in blood pressure, R is measured in millimeters of mercury.

If the reaction is a change in in temperature, R is measured in degrees, and so on.

Find dR/dM. This derivative, as function of M, is called the sensitivity of the body to medicine.

*(Source: Mathematical Models in Biology)*

Let f(x) = x4 – 4x2.

a. Find all the points where f has horizontal tangents.

b. Find an equation of the tangent line at x = 1

c. Find an equation of the normal line at x = 1 (normal line is perpendicular to tangent line)

Assessment

Given function f(x) = x2. Find the tangent of this curve at point (2, 0). Sketch

Fill in the table



Find the derivative of the following function

|  |  |  |  |
| --- | --- | --- | --- |
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