

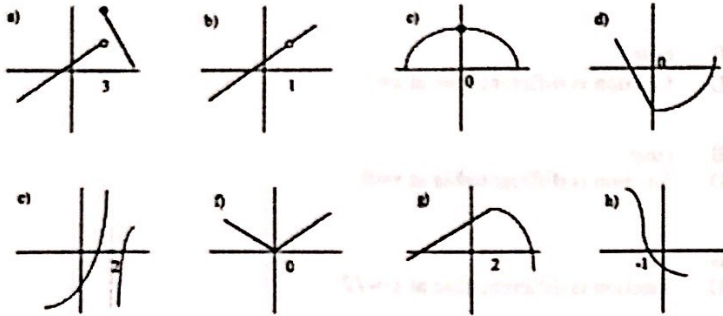
AP Calculus AB

Differentiability

HW 2-10

Name: _____

20. **Example:** Determine the following functions are continuous, differentiable, neither, or both at the point.

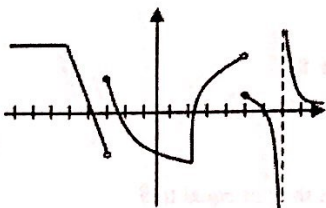


- (a) Continuous ___ Differentiable ___ Neither ___
- (b) Continuous ___ Differentiable ___ Neither ___
- (c) Continuous ___ Differentiable ___ Neither ___
- (d) Continuous ___ Differentiable ___ Neither ___
- (e) Continuous ___ Differentiable ___ Neither ___
- (f) Continuous ___ Differentiable ___ Neither ___
- (g) Continuous ___ Differentiable ___ Neither ___
- (h) Continuous ___ Differentiable ___ Neither ___

21. **Example:** Given the following graph, at what points does the function appear to be:

- (a) Continuous but not differentiable—

- (b) Neither continuous nor differentiable—



22. **Example:** Discuss the continuity and differentiability of the function $f(x) = |x - 2|$.

23. **Example:** Discuss the continuity and differentiability of the function $f(x) = x^{1/3}$.

4. **Example:** Find if $f(x)$ is continuous and/or differentiable at $x = -1$.

$$f(x) = \begin{cases} x^2 + x - 3 & x \geq -1 \\ -x - 4 & x < -1 \end{cases}$$

25. **Example:** Find if $f(x)$ is continuous and/or differentiable at $x = 2$.

$$f(x) = \begin{cases} x^2 - 6x + 10 & x \geq 2 \\ 4 - x & x < 2 \end{cases}$$

26. **Example:** Find the value a and b that make the function $f(x)$ differentiable.

$$f(x) = \begin{cases} ax^2 + 1 & x \geq 1 \\ bx - 3 & x < 1 \end{cases}$$

If the function is not differentiable at the given value of x , tell whether the problem is a corner, cusp, vertical tangent, or a discontinuity.

5. $y = -3|x| - 9$, at $x = 0$

- A. vertical tangent
C. corner

- B. cusp
D. function is differentiable at $x=0$

6. $y = \frac{8}{x+2}$, at $x = -2$

- A. vertical tangent
C. corner

- B. cusp
D. function is differentiable at $x=2$

7. $y = 3 - \sqrt[3]{x}$, at $x = 0$

- A. vertical tangent
C. corner

- B. cusp
D. function is differentiable at $x=0$

8. $y = \sqrt[3]{|x+12|}$, at $x = -12$

- A. vertical tangent
C. corner

- B. cusp
D. function is differentiable at $x=-12$

Determine the values of x for which the function is differentiable.

9) $y = 6x - 1$

- A) All reals except 0.16666667
C) All reals except -1

- B) All reals
D) All reals except 6

9) _____

10) $y = \frac{1}{x-7}$

- A) All reals except 1
C) All reals except 7

- B) All reals
D) All reals except -7

10) _____

11) $y = \frac{1}{x^2 - 121}$

- A) All reals
C) All reals except 121

- B) All reals except 11
D) All reals except -11 and 11

11) _____

12) $y = x^2 - 49$

- A) All reals except 7
C) All reals

- B) All reals except 49
D) All reals except -7 and 7

12) _____

13) $y = \frac{1}{x^2 + 64}$

- A) All reals except 64
C) All reals except -8 and 8

- B) All reals
D) All reals except 8

13) _____

14) $y = \sqrt{x-5}$

- A) All reals greater than -5
C) All reals except 5

- B) All reals greater than or equal to 5
D) All reals greater than 5

14) _____

15) $y = \sqrt{x^2 + 9}$

- A) All reals except 3
C) All reals

- B) All reals except 9
D) All reals except -3 and 3

15) _____