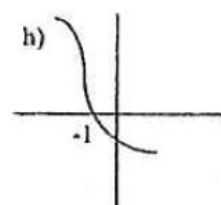
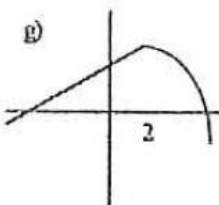
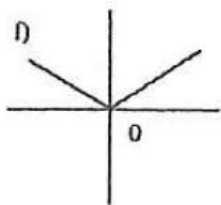
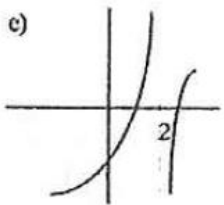
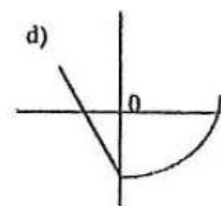
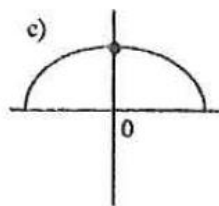
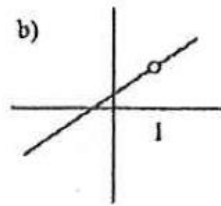
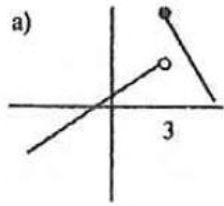


Differentiability ... Practice Set 1

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

Differentiability ... Practice Set 1

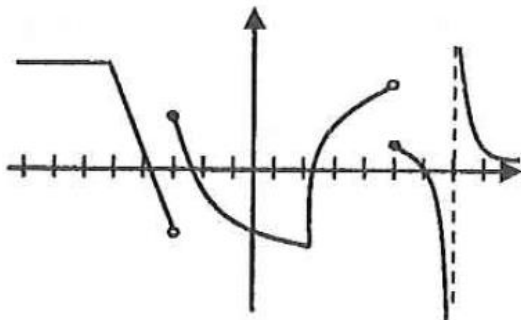
21. *Example:* Given the following graph, at what points does the function appear to be:

(a) Continuous but not differentiable—

-5, 2

(b) Neither continuous nor differentiable—

-3, 5, 7



Differentiability ... Practice Set 1

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

continuous everywhere
not diff. at $x = 2$

Differentiability ... Practice Set 1

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

Continuous everywhere
not diff. at $x = 0$

Differentiability ... Practice Set 1

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

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

Cont

$$x^2 + x - 3 \stackrel{?}{=} -x - 4$$
$$(-1)^2 + (-1) - 3 \stackrel{?}{=} -(-1) - 4$$
$$-3 \stackrel{?}{=} -3$$

Yes

BOTH

Diff

$$2x + 1 \stackrel{?}{=} -1$$
$$2(-1) + 1 \stackrel{?}{=} -1$$
$$-1 = -1$$

Yes

Differentiability ... Practice Set 1

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

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

Cont.

$$x^2 - 6x + 10 = 4 - x$$

$$(2)^2 - 6(2) + 10 = 4 - (2)$$

$$2 = 2$$

Yes

Cont. but
not diff

Diff

$$2x - 6 \stackrel{?}{=} -1$$

$$2(2) - 6 \stackrel{?}{=} -1$$

$$-2 = -1$$

No

Differentiability ... Practice Set 1

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

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

Cont.

$$ax^2 + 1 = bx - 3$$

$$a(1)^2 + 1 = b(1) - 3$$

$$a + 1 = b - 3$$

Diff

$$2ax = b$$

$$2a(1) = b$$

$$2a = b$$

$$a + 1 = (2a) - 3$$

$$4 = a$$

$$8 = 2(4) = b$$

3

$$\begin{aligned} a &= 4 \\ b &= 8 \end{aligned}$$