HW 1-2 Fr Chris

Due Aug 23

P.3 (p 27) 5, 6, 7, 11, 23, 25, 27, 29, 58, 65, 67, 73, 75

1.2 (p 59) 5, 7, 9, 21, 23, 25, 27, 28, 29, 30, 31, 33

Read 1.3 (63-68) ✓

⑤ $f(x) = 3x - 2$ (a) $f(0) = -2$ (b) $f(5) = 3(5) - 2$

(c) $f(b) = 3b - 2$ (d) $f(x-1)$

$= 3(x-1) - 2$

⑥ $f(x)\ 7x - 4$ a. $f(0) = -4$ b. $f(-3) = 7(-3) - 4$

c. $f(b) = 7b - 4$ d. $f(x+2) = 7(x+2) - 4$

$f(x+2) = 7x + 14 - 4$

$f(x+2) = 7x + 10$

⑦ $f(x) = \sqrt{x^2+4}$

a. $f(-2) = \sqrt{4+4} = 2\sqrt{2}$

b. $f(3) = \sqrt{9+4} = \sqrt{13}$

c. $f(2) = \sqrt{4+4} = 2\sqrt{2}$

d. $f(x+\Delta x) = \sqrt{(x+\Delta x)^2 + 4}$

$= \sqrt{x^2 + 2\Delta x + (\Delta x)^2 + 4}$

⑪ $f(x) = x^3$

$$\frac{f(x+\Delta x) - f(x)}{\Delta x}$$ So $\Delta x \neq 0$, right? right!

$$\frac{(x+\Delta x)^3 - x^3}{\Delta x}$$

$$\frac{x^3 + 3x^2\Delta x + 3x(\Delta x)^2 + (\Delta x)^3 - x^3}{\Delta x}$$

$$3x^2 + 3x(\Delta x) + (\Delta x)^2$$

㉓ Domain of $f(x) = \sqrt{x} + \sqrt{1-x}$

Since $x \geq 0$ and $1 - x \geq 0 \rightarrow 1 \geq x \Rightarrow x \leq 1$

Domain is $[0, 1]$

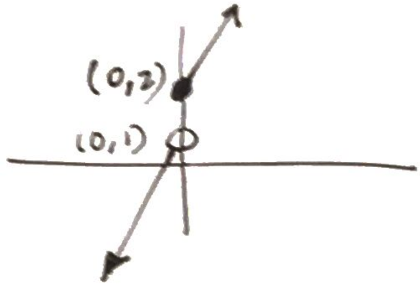
p27

25 $f(x) = \dfrac{1}{|x+3|}$ so $x+3 \neq 0 \rightarrow x \neq -3$

Domain $(-\infty, -3) \cup (-3, \infty)$

p21 27

$$f(x) = \begin{cases} 2x+1, & x < 0 \\ 2x+2, & x \geq 0 \end{cases}$$



a. $f(-1) = 2(-1)+1 = -1$

b. $f(0) = 2(0)+2 = 2$

c. $f(2) = 2(2)+2 = 6$

d. $f(t^2+1) = 2(t^2+1)+2$

$= 2t^2+4$

Domain $(-\infty, \infty)$

Range: $(-\infty, 1) \cup [2, \infty)$

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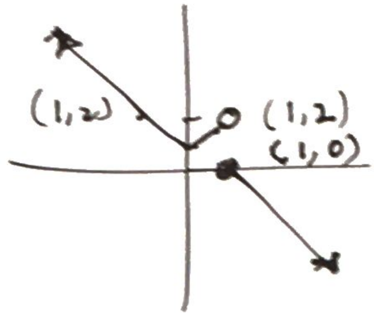
$$f(x) = \begin{cases} |x|+1, & x < 1 \\ -x+1, & x \geq 1 \end{cases}$$



a. $f(-3) = |-3|+1 = 4$

b. $f(1) = -1+1 = 0$

c. $f(3) = -3+1 = -2$

d. $f(b^2+1) = -(b^2+1)+1$

$f(b^2+1) = -b^2-1+1 = -b^2$

why? Since $b^2 \geq 0$

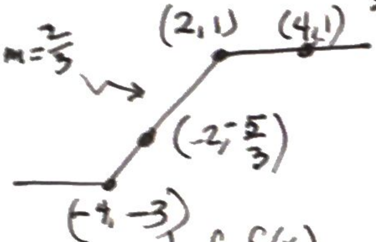
so $b^2+1 \geq 1$

Domain: $(-\infty, \infty)$

Range: $(-\infty, 0] \cup [1, \infty)$

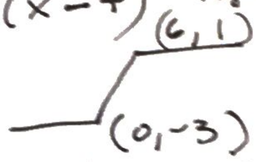
p28

* 58 $m = \frac{2}{3}$

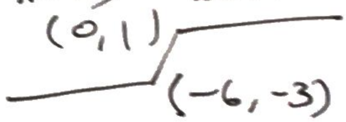


graph of $f(x)$

a. $f(x-4)$ right shift of 4



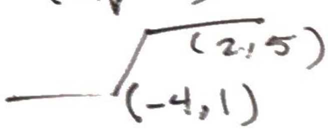
b. $f(x+2)$ left 2



f. $\frac{1}{2}f(x) = (2,1) \to (2, \frac{1}{2})$

$(-4,-3) \to (-4, -3/2)$

c. $f(x)+4$ (up 4)



g. $f(-x)$ - mirror

$(2,1) \to (2, f(-2))$

$(-4,3) \to (-4, f(4))$ (-4,1)

$\boxed{\begin{array}{l} \text{or } g(-2) = f(2) \\ g(4) = f(-4) \end{array}}$

d. $f(x)-1$ down 1

e. $2f(x)$: $(2,1) \to (2,2)$

$(-4,3) \to (-4,6)$

h. $-f(x) = (2,1) \to (2,-1)$

$(-4,3) \to (-4,3)$

p26 65, 67, 75

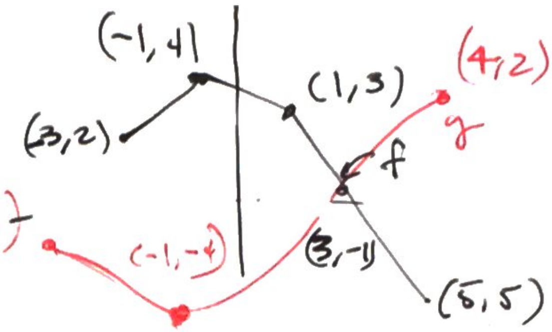
Find $f \circ g(x)$ and $g \circ f(x)$

(65) $f(x) = \frac{3}{x}$
$g(x) = x^2 - 1$

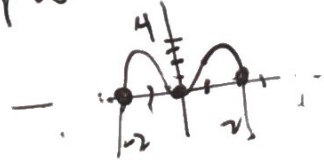
$f(g(x)) = f(x^2-1)$
$= \frac{3}{x^2-1}$

$g(f(x)) = g\left(\frac{3}{x}\right)$
$= \left(\frac{3}{x}\right)^2 - 1$
$= \frac{9 - x^2}{x^2}$

(67) a. $(f \circ g)(3) = f(g(3)) = f(-1) = 4$
b. $g(f(2)) = g(1) = -2$
c. $g(f(5)) = g(-5) =$ undef.
d. $(f \circ g)(-3) = f(g(-3)) = f(-2) = 3$
e. $(g \circ f)(-1) = g(f(-1)) = g(4) = 2$
f. $(f \circ g)(-1) = f(g(-1)) = f(-4)$, undefined



(75) $f(x) = x^2(4 - x^2) = x^2(4 - x)(4 + x)$ Graph
$f(-x) = (-x)^2(4 - (-x)^2) = f(x)$ (even function)
zeros: $f(0) = 0$, $f(2) = 0$, $f(-2) = 0$
So $(0,0)$, $(2,0)$, $(-2,0)$



(HW 1-2)

(p59) Section 1.2

5, 7, 9, 21, 23, 25, 27, 28, 29, 30, 31, 33

⑤ $\lim_{x \to 4} \frac{x-4}{x^2-5x+4}$ (use TableSet > Ind-ASK Dep-AUTO w/TABLE)

3.9	3.99	3.999	4	4.001	4.01	4.1

⑦ $\lim_{x \to 0} \frac{\sqrt{x+1}-1}{x}$

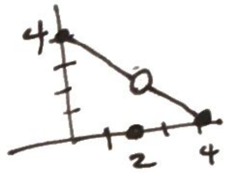
-.1	-.01	-.001	0	.001	.01	.1

⑨ $\lim_{x \to 0} \frac{\sin x}{x}$

-.1	-.01	-.001	0	.001	.01	.1

㉓ $\lim_{x \to 3} (4-x) = 4-3 = 1$

㉘ $\lim_{x \to 2} f(x)$ where $f(x) = \begin{cases} 4-x, & x \neq 2 \\ 0, & x = 2 \end{cases}$

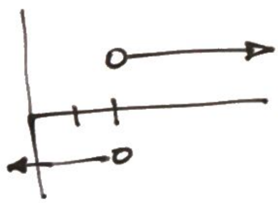


$\lim_{x \to 2^-} f(x) = 4-2 = 2$

$\lim_{2^+} f(x) = 4-2 = 2$

but $f(2) = 0$ so $\lim_{x \to 2} f(x)$ D.N.E.

㉕ $\lim_{x \to 2} \frac{|x-2|}{x-2}$



$\lim_{x \to 2^-} \frac{|x-2|}{x-2} = -1$

$\lim_{x \to 2^+} \frac{|x-2|}{x-2} = 1$

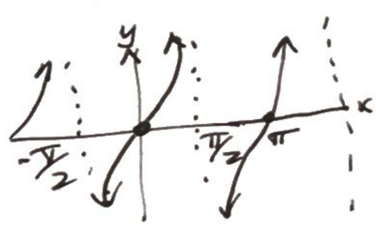
so $\lim_{x \to 2} \frac{|x-2|}{x-2}$ D.N.E.

㉗ $\lim_{x \to 0} \cos \frac{1}{x}$

oscillates b/t -1 & 1

$\therefore \lim_{x \to 0} \cos \frac{1}{x}$ D.N.E.

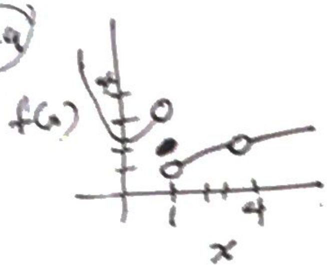
㉘ $\lim_{x \to \frac{\pi}{2}} \tan x$



$\lim_{x = \frac{\pi}{2}^-} \tan x = +\infty$

$\lim_{x = \frac{\pi}{2}^+} \tan x = -\infty$ $\therefore \lim_{x \to \frac{\pi}{2}} \tan x$ D.N.E.

p 60 (29)



a. $f(1) = 2$

b. $\lim_{x\to 1} f(x)$ DNE

since $\lim_{x\to 1^-} f(x) \approx 3$ & $\lim_{x\to 1^+} f(x) \approx 1$

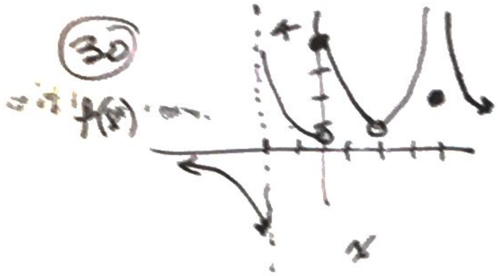
c. $f(4)$ = undefined

d. $\lim_{x\to 4} f(x) = 2$

since $\lim_{x\to 4^-} f(x) = 2$ and

$\lim_{x\to 4^+} f(x) = 2$

(30)



a. $f(-2)$ undefined

b. $\lim_{x\to -2} (-2)$ DNE (since $\lim_{x\to -2^-} f(x) = -\infty$

and $\lim_{x\to -2^+} f(x) = +\infty$)

c. $f(0) = 4$

d. $\lim_{x\to 0} f(x)$ DNE since $\lim_{x\to 0^-} f(x) < 1$

and $\lim_{x\to 0^+} f(x) = 4$

e. $f(2)$ undefined

f. $\lim_{x\to 2} f(x) = 1$ since $\lim_{x\to 2^-} f(x) = 1$

and $\lim_{x\to 2^+} f(x) = 1$

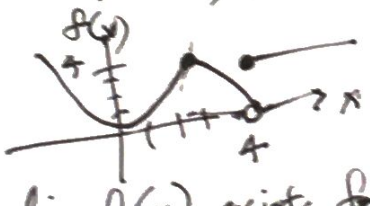
g. $f(4) = 2$

h. $\lim_{x\to 4} f(x)$ DNE since

$\lim_{x\to 4^-} f(x) = +\infty$

and $\lim_{x\to 4^+} f(x) = +\infty$

(31) $f(x) = \begin{cases} x^2 & , x \le 2 \\ 8-2x & , 2 < x \; 4 \\ 4 & , x \ge 4 \end{cases}$

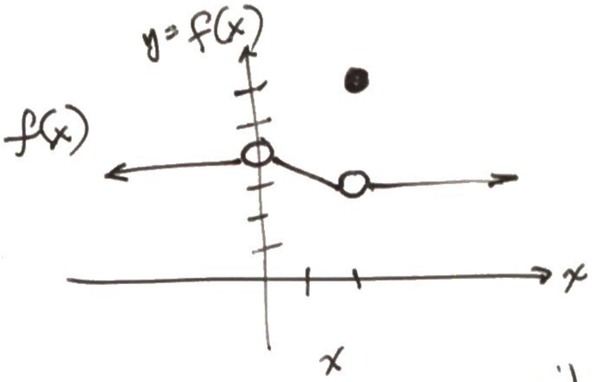


$\lim_{x\to c} f(x)$ exists for all $c \ne 4$

p60

33 Sketch a function f that satisfies the following

- $f(0)$ is undefined
- $\lim_{x \to 0} f(x) = 4$
- $f(2) = 6$
- $\lim_{x \to 2} f(x) = 3$



is one of many possibilities