

Calculus

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domain
p25 13, 17, (23, 25, 29), 65, 71, (35, 39, 78)

13. yes, its a function

17. yes, its a function

23. $f(x) = \frac{1}{(x+3)^2}$

$f(4) = \frac{1}{(4+3)^2} = \frac{1}{49}$

$f(-3) = \text{undefined}$

$f(0) = \frac{1}{9}$

$f(x+h) - f(x)$

a.

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

$\frac{1}{(f(x+h)-f(x)+3)^2}$

$\frac{1}{(x+h+3)^2}$

$f(a) = \frac{1}{(a+3)^2}$

$\frac{1}{a^2+6a+9}$

$f(t+4) = \frac{1}{(t+4+3)^2}$

$\frac{1}{t^2+14t+49}$

$f(x+h) = \frac{1}{(x+h+3)^2}$

$\frac{1}{x^2+h^2+2xh+9+3x+3h}$

$\frac{1}{(x+3)^2} - \frac{1}{(x+h+3)^2} = \frac{(x+3)^2 - (x+h+3)^2}{(x+3)^2(x+h+3)^2}$

all real
ex -3

b. It doesn't change

25. $f(x) = 2x - 5$

x	y
3	1
-2	-9

 $(-\infty, \infty)$ All real #

29. $f(x) = x^2 - 2$ Range $(-2, \infty)$ All real #

65. 2005 = 600,000,000
2001 $y \geq -2$

71. a) 170cm $S = \sqrt{\frac{170 \times 170}{3600}} = 1.8$

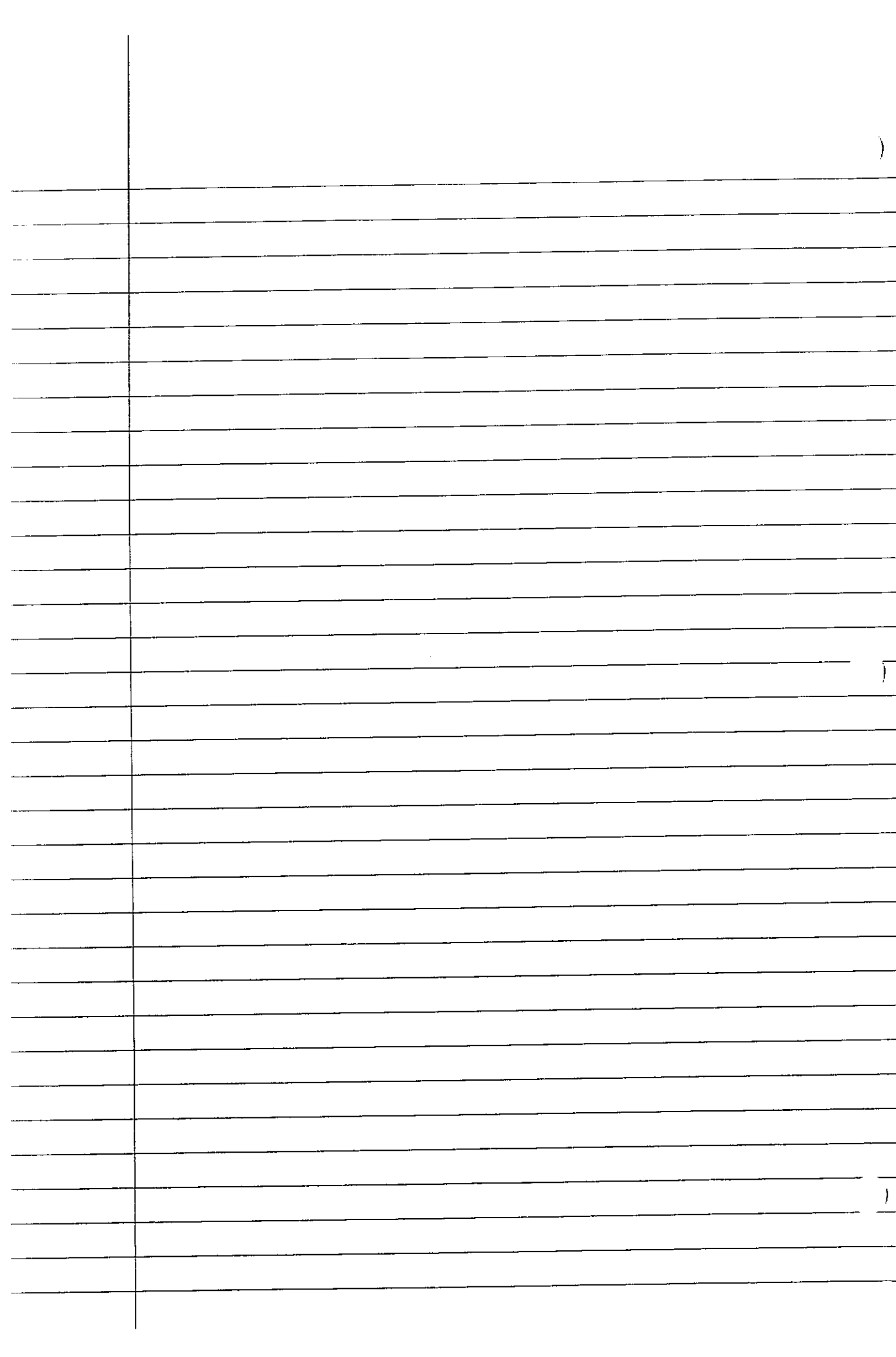
b) 100cm $S = \sqrt{\frac{170 \times 170}{3600}} = 2.2$

c) 50 $S = \sqrt{\frac{170 \times 170}{3600}} = 1.5$

35. yes

39. no

78. doesn't touch 2 points on line



13. yes

17. yes

23. $f(x) = \frac{1}{(x+3)^2}$

a. $\frac{1}{49}$

0

$\frac{1}{9}$

$\frac{1}{(x+3)^2}$
 $\frac{1}{(x+4)^2}$

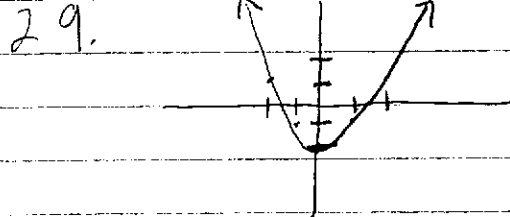
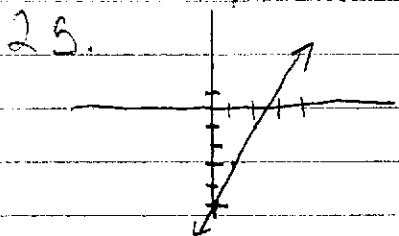
$\frac{1}{t^2 + 6t + 9}$
 $\frac{1}{t^2 + 14t + 49}$

$\frac{1}{(t+4)+3)^2}$
 $\frac{1}{(t+7)^2}$
 $t^2 + 14t + 49$

$(x+h+3)^2$

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

b. take a number, square it. then add that number multiplied by six to that value. then add nine to that. then divide one by that number.



65. a. 600 CDs

b. 200

71. a. 1.818

b. 2.173

c. 0.247

35. yes

39. no

70. there can be 2 domains for every range
but there can't be 2 ranges for
every domain.

13. Yes

65, 71

17. Yes

35, 39, 78

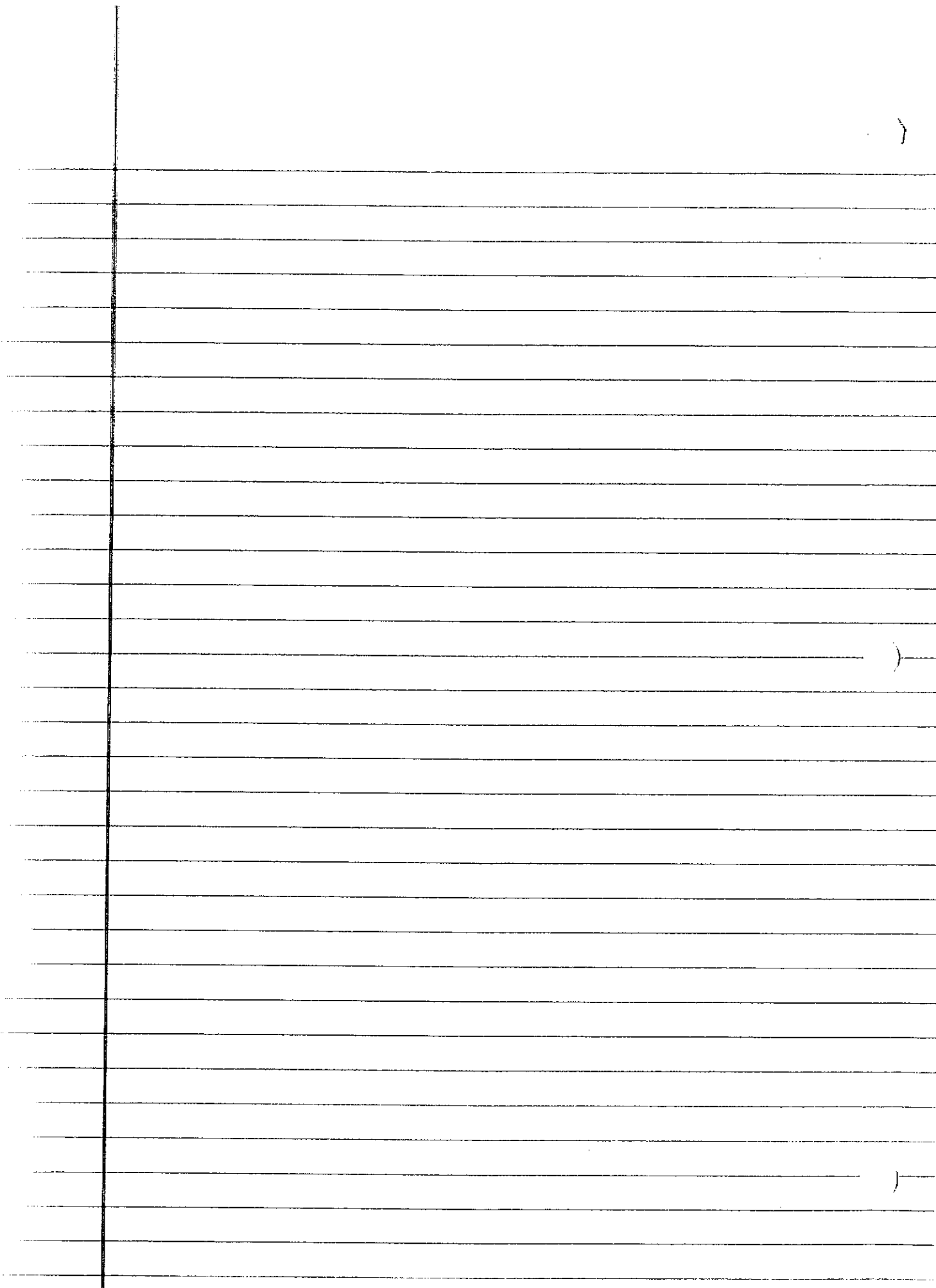
23. a) $f(x) = \frac{1}{(x+3)^2}$

x	4	-3	0	9	$x+h$	$\frac{(x+h)-f(x)}{h}$
$f(x)$	$\frac{1}{49}$	undef.	$\frac{1}{9}$	$\frac{1}{(9+3)^2}$	$\frac{1}{(x+h+3)^2}$	$\frac{(x+3)^2 - (x+h+3)^2}{h(x+h+3)^2(x+3)^2}$

$$\frac{1}{(x+h+3)^2} - \frac{1}{(x+3)^2} = \frac{(x+3)^2}{(x+h+3)^2(x+3)^2} - \frac{(x+h+3)^2}{(x+h+3)^2(x+3)^2}$$

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

b) $f(x) = \frac{1}{x^2 + 6x + 9}$; the input number x would not change.
 $D = (-\infty, -3) \cup (-3, \infty)$



Math 060

1) Tiana, Emily, Mitch
Page 25

#13 yes, a function

#17 yes, a function

#23 a. $f(x) = \frac{1}{(x+3)^2}$

$f(4) = \frac{1}{49}$ $f(0) = \frac{1}{9}$

$f(-3) = \text{undefined}$ $f(a) = \frac{1}{a^2+9+6a}$

$f(t+4) = \frac{1}{t^2+49+14t}$

$f(x+h) = \frac{1}{(x+h+3)^2}$

$$\frac{1}{a^2+9+6a}$$

$$\frac{1}{t^2+49+14t}$$

$$\frac{1}{(x+h+3)^2}$$

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

$$\frac{\frac{1}{(x+h+3)^2} - \frac{1}{(x+3)^2}}{h}$$

$$\frac{1}{x+h+3} - \frac{1}{x+3} = \frac{(x+3)^2}{(x+h+3)^2(x+3)^2} - \frac{(x+h+3)^2}{(x+3)^2(x+h+3)^2} =$$

$$\left(\frac{(x+3)^2 - (x+h+3)^2}{(x+h+3)^2(x+3)^2}\right) \div h = \boxed{\frac{(x+3)^2 - (x+h+3)^2}{h(x+h+3)^2(x+3)^2}}$$

$$\cancel{x^2+6x+9} - (\cancel{x^2+3x+h^2+9}) = \frac{3x}{h(x+h+3)^2(x+3)^2}$$

* Domain = all real # except for -3

25. Domain = all real numbers
29. Domain = all real numbers



65. a) 600 CD's
b) year 2001

71. a) 1.8 m^2
b) ~~0.60876 m^2~~ 2.173 m^2
c) 1.537 m^2

35. passes vertical line test = function

39. fails vertical line test = not a function

78. it shows if each $f(x)$ only has one output,

p. 25, # 13, 17, 19, 23 (domain), 25 (domain), 29 (domain), 65,
71, 35, 39, 78

13. Function

17. Function

23. a.) $f(x) = \frac{1}{(x+3)^2}$ Domain: ~~all real numbers~~ \mathbb{R} but -3
 $(-\infty, -3) \cup (-3, \infty)$

$$f(4) = \frac{1}{(4+3)^2} = \frac{1}{49}$$

$$f(-3) = \frac{1}{(3+3)^2} = \frac{1}{0} \text{ or undefined}$$

$$f(0) = \frac{1}{(0+3)^2} = \frac{1}{9}$$

$$f(a) = \frac{1}{(a+3)^2} = \frac{1}{2a^2 + 6a + 9}$$

FOIL $(a+3)(a+3)$
 $2a^2 + 3a + 3a + 9$
 $2a^2 + 6a + 9$

$$f(t+4) = \frac{1}{((t+4)+3)^2} = \frac{1}{t^2 + 14t + 49}$$

$$((t+4)+3)((t+4)+3)$$

$$(\cancel{t+7})(\cancel{t+7})$$

$$t^2 + 14t + 49$$

$$f(x+h) = \frac{1}{((x+h)+3)^2}$$

$$(x+h+3)(x+h+3)$$

$$= \frac{1}{x^2 + 2xh + 2(3x) + h^2 + 2(3h) + 9}$$

$$= \frac{1}{x^2 + h^2 + 2xh + 2(3x) + 2(3h) + 9}$$

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

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

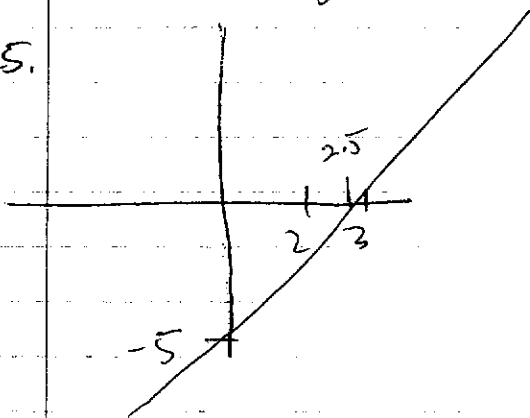
$$\frac{f(x+h) - f(x)}{h} = \frac{(x+3)^2 - (x+h+3)^2}{h(x+h+3)^2 (x+3)^2}$$

$$\begin{aligned} & \frac{(x+3)(x+3) - (x+h+3)(x+h+3)}{h(x+h+3)^2 (x+3)^2} \\ & \frac{x^2 + 6x + 9 - x^2 - h^2 - 2(3x) - 2(3h) - 9}{h(x+h+3)^2 (x+3)^2} \\ & \frac{h^2 + 6h}{h(x+h+3)^2 (x+3)^2} \end{aligned}$$

b. $f(x) = \frac{1}{x^2 + 6x + 9}$

Same as $(x+3)^2$ but not simplified. The input x is not changed. Domain = \mathbb{R}

25.



29.

