01/24 HW

p. 22

1. $f(x) = 2-3x$

a) $f(2) = 2-3(2)$ b) $f(0) = 2$ c) $f(-4)$ d) $f\left(\frac{1}{2}\right)$ e) $f(a)$ f) $f(3b)$

$= -4$ $= 14$ $= 2-3\left(\frac{1}{2}\right)$ $= 2-3a$ $= 2-9b$

$= \frac{1}{2}$

2. From the given graphs:

a) $f(1) = 2$ b) $g(-2) = 4$ c) $f(4) - g(-2)$ d) $x = -3$ and 4 when $f(x) = -3$

$= -1 - 4$

$= -5$

or $f(-3) = -3$ and $f(-4) = -3$

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

a) $f(-3) = \frac{1}{-6}$ b) $f(0) = \emptyset$ undefined c) $f(1) - f(3)$ d) $f\left(\frac{1}{4}\right) + f\left(\frac{3}{4}\right)$

or $-\frac{1}{6}$

$= \frac{1}{2} - \frac{1}{6}$

$= \frac{3}{6} - \frac{1}{6}$

$= \frac{2}{6}$ or $\frac{1}{3}$

$= 1 \div \frac{1}{\left(\frac{1}{4}\right)_2} + 1 \div \frac{1}{\left(\frac{3}{4}\right)_2}$

$= 1 \times \frac{2}{1} + 1 \times \frac{2}{3}$

$= 2 + \frac{2}{3}$

$= \frac{8}{3}$

Text error: they have zero also

6. a) $D: \{-2, 2, 3, 5, 7\}$ $R: \{1, 2, 3, 4, 5\}$

b) i) $f(3) = 4$ (ii) $f(5) = 2$ (iii) $f(5-3)$ (iv) $f(5) - f(3)$

$= f(2)$ $= 2 - 4$

$= 5$ $= -2$

7. $h(x) = 2x-5$

b) $h(b+1) = 2(b+1)-5$ d) $h(2-5x) = 2(2-5x)-5$

$= 2b-3$ $= -10x - 1$

9. $f(s) = s^2 - 6s + 9$

a)

s	f(s)
0	9
1	4
2	1
3	0

b) (i) $f(0) = 9$

(ii) $f(1) = 4$

(iii) $f(2) = 1$

(iv) $f(3) = 0$

(v) $[f(2) - f(1)] - [f(1) - f(0)]$

$= (1-4) - (4-9)$

$= -3 - (-5)$

$= 2$

(vi) $[f(3) - f(2)] - [f(2) - f(1)]$

$= (0-1) - (1-4)$

$= -1 - (-3)$

$= 2$

c) The answers to (v) and (vi) are the same; they are the 2nd diff which are constant for a quadratic equ^n

10. $f(x) = 2(x-3)^2 - 1$ and graph given

a) $f(-2) = 2(-5)^2 - 1$
$= 49$

b) $f(-2)$ rep the pt $(-2, 49)$ on the graph

d) The graph shows that the function passes the vertical line test so it is a function.

11 a) $g(x) = 4 - 5x$, given the outputs ($g(x)$ values), determine the x-values (input)

a) $g(x) = -6$
$-6 = 4 - 5x$
$-10 = -5x$
$x = \frac{-10}{-5}$
$\boxed{x = 2}$

b) $g(x) = 2$
$2 = 4 - 5x$
$-2 = -5x$
$x = \frac{2}{5}$

c) $g(x) = 0$
$0 = 4 - 5x$
$x = \frac{4}{5}$

d) $g(x) = \frac{3}{5}$
$\frac{3}{5} = 4 - 5x$
$-\frac{17}{5} = -5x$
$\boxed{x = \frac{17}{25}}$

16. $f(x) = x^2 + 2x - 15$

a) sub $f(x) = 0$
$0 = x^2 + 2x - 15$
$0 = (x+5)(x-3)$
$\therefore x = -5, 3$

b) $f(x) = -12$
$-12 = x^2 + 2x - 15$
$0 = x^2 + 2x - 3$
$0 = (x+3)(x-1)$
$\therefore x = -3, 1$

c) $f(x) = -16$
$-16 = x^2 + 2x - 15$
$0 = x^2 + 2x + 1$
$0 = (x+1)^2$
$\therefore x = -1$

17. $f(x) = 3x + 1$, $g(x) = 2 - x$

a) $f(a) = g(a)$
$3a + 1 = 2 - a$
$4a = 1$
$\boxed{a = \frac{1}{4}}$

b) $f(a^2) = g(2a)$
$3a^2 + 1 = 2 - (2a)$
$3a^2 + 1 = 2 - 2a$
$3a^2 + 2a - 1 = 0$
$(3a - 1)(a + 1) = 0$
$\therefore a = \frac{1}{3}, -1$

19. a) To find the linear equ^n that converts x_1 285 to y_1 200 and x_2 75 to y_2 60:

sub (285, 200)
$200 = 285m + b$
or $285m + b = 200$ (1)

sub (75, 60)
$60 = 75m + b$
or $75m + b = 60$ (2)

(1) − (2)
$285m + b = 200$
$-\ 75m + b = 60$
$210m = 140$
$m = \frac{14}{21}$ or $\frac{2}{3}$

sub in (2)
$25 \cancel{75}\,(\frac{2}{3}) + b = 60$
$\boxed{b = 10}$

∴ The equ^n is $y = \frac{2}{3}x + 10$
or $M(x) = \frac{2}{3}x + 10$.

b) $M(95) = 73\frac{1}{3}$
$M(175) = 126\frac{2}{3}$
$M(215) = 153\frac{1}{3}$
$M(255) = 180$