


CHAPTER 11

Ex 11A

- 8a Domain $x \in \mathbb{R}$
Range $y \in \mathbb{R}$
- b Domain $x \in \mathbb{R}, x \neq 0$
Range $y \in \mathbb{R}, y \neq 0$
- c Domain $3x+2 \neq 0$
 $x \neq -\frac{2}{3}, x \in \mathbb{R}$
Range $y \in \mathbb{R}, y \neq 0$
- d Domain $(x-3)^2 \neq 0$
 $x \neq 3$
Range $y > 0$ ✓
- 9g Domain $x(4-x) \geq 0$ $4x-x^2$
 $x=0, x=4$ $-[(x-2)^2-4]$

 $0 \leq x \leq 4$
Range $0 \leq y \leq 2$ ✓
- h Domain $x \in \mathbb{R}$
Range $y = x^2 + 4x + 10$
 $= (x+2)^2 - 4 + 10$
 $= (x+2)^2 + 6$
 $y \geq 6$
- i Domain $x-3 \geq 0$
 $x \geq 3$
 $y = (1-\sqrt{x-3})^2$
 $y_{\min} = 0$
Range $y \geq 0$
- 15 $f(x) = x+4$
 $g(x) = 3x$
 $h(x) = x^2$
- a $x \rightarrow x^2+4$
fh
- b $x \rightarrow 3x+4$
fg
- c $x \rightarrow x^4$
hh
- d $x \rightarrow gx^2$
hg
- e $x \rightarrow 3x+12 = 3(x+4)$
gf
- f $x \rightarrow 3(x^2+8)$
fh = x^2+4
ffh = x^2+8
gffh = $3(x^2+8)$
- g $x \rightarrow gx+16$
fg = $3x+4$
fgfg = $3(3x+4) = 9x+12$
fgfgfg = $9x+16$
- h $x \rightarrow x^2+8x+16$
 $= (x+4)^2 = hf$
- i $x \rightarrow 9x^2+48x+64$
 $= (3x+8)^2$
 $= fg = 3x+4$
ffg = $3x+8$
hffg = $(3x+8)^2$
- 16 a $f(x) = \sqrt{x}$
 $g(x) = x-5$
Domain $x \geq 0$
 $gf = \sqrt{x}-5$
Range $gf \geq -5$
- b $f(x) = x+3$ $g(x) = \sqrt{x}$
Domain
 $gf = \sqrt{x+3}$ $x+3 \geq 0$
 $x \geq -3$
Range $gf \geq 0$
- c $f(x) = x-2$ $g(x) = \frac{1}{x}$
 $gf = \frac{1}{x-2}$
Domain $x \neq 2$
Range $gf \neq 0$
- d $f(x) = \sin x$ $g(x) = \sqrt{x^2}$
 $gf = \sqrt{\sin^2 x}$
Domain
 $\sin^2 x \geq 0$
 $x \in \mathbb{R}$
Range $0 \leq gf \leq 1$


e. $f(x) = \sqrt{(x-3)^2}$
 $g(x) = \sqrt{x}$
 $gf = \sqrt{\sqrt{(x-3)^2}} = \sqrt[4]{(x-3)^2}$
 Domain $x \in \mathbb{R}$
 Range: $gf \geq 0$

17 $f(x) = x^2$
 $g(x) = 3x - 2$

a $fg(a) = 100$
 $(3a-2)^2 = 100$
 $9a^2 - 12a + 4 - 100 = 0$
 $9a^2 - 12a - 96 = 0$
 $3a^2 - 4a - 32 = 0$
 $(3a+8)(a-4) = 0$
 $a = -\frac{8}{3}, a = 4$

b $gg(b) = 55$
 $3(3a-2) - 2 = 55$
 $9a - 8 - 55 = 0$
 $9a - 63 = 0$
 $9a = 63$
 $a = 7$

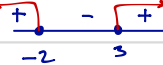
c $fg(c) = gf(c)$
 $(3c-2)^2 = 3c^2 - 2$
 $9c^2 - 12c + 4 = 3c^2 - 2$
 $6c^2 - 12c + 6 = 0$
 $c^2 - 2c + 1 = 0$
 $(c-1)^2 = 0$
 $c = 1$

f $f(x) = 16 - x^2$
 $g(x) = \sqrt[4]{x}$
 $gf = \sqrt[4]{16 - x^2}$
 Domain
 $16 - x^2 \geq 0$
 $(4+x)(4-x) \geq 0$
 $x = -4, 4$

 $-4 \leq x \leq 4$
 Range $0 \leq gf \leq 2$

18. $f(x) = ax + b$
 $ff(x) = gx - 28$
 $a(ax+b) + b = gx - 28$
 $a^2x + ab + b = gx - 28$
 $a^2x + b(a+1) = gx - 28$
 $a^2 = g \Rightarrow a = \pm 3$
 $a = 3$ $a = -3$

19 $f(x) = ax + b$
 $f(2) = 19 = 2a + b \Rightarrow b = 19 - 2a$
 $ff(0) = 55$
 $f(0) = b$
 $ff(0) = f(b) = ab + b = 55$
 $b(a+1) = 55$
 $(19-2a)(a+1) = 55$
 $19a + 19 - 2a^2 - 2a = 55$
 $2a^2 - 17a + 36 = 0$
 $(2a-9)(a-4) = 0$
 $a = \frac{9}{2}, a = 4$
 \downarrow \downarrow
 $b = 19 - 9 = 10$ $b = 19 - 8 = 11$

$b(4) = -28$ $b(-2) = -28$
 $b = -7$ $b = 14$

g $f(x) = x^2 - x - 6$
 $g(x) = \sqrt{x}$
 $gf = \sqrt{(x-3)(x+2)}$
 Domain
 $(x-3)(x+2) \geq 0$

 $x \leq -2, x \geq 3$

20 $f(x) = 4x + 1$
 $g(x) = ax + b$
 $fg = gf$
 $4(ax+b) + 1 = a(4x+1) + b$
 $4ax + 4b + 1 = 4ax + a + b$
 $4b + 1 = a + b$
 $a = 4b - b + 1$
 $a = 3b + 1$

h $f(x) = x + 2$
 $g(x) = \frac{1}{\sqrt{-x}}$
 $gf = \frac{1}{\sqrt{-(x+2)}}$
 Domain $-(x+2) > 0$ Range: $gf > 0$
 $x+2 < 0$
 $x < -2$