

EXERCISE 11 B

2 $f(x) = x - 6$

d $ff^{-1}(5) =$
 $f^{-1}(x) = x + 6$
 $f^{-1}(5) = 11$
 $ff^{-1}(5) = f(11) = 5$

e. $f(-4) = -10$
 $f^{-1}f(-4) = f^{-1}(-10) = -4$

3 $f(x) = 5x$ $f^{-1}(x) = \frac{x}{5}$

d. $ff^{-1}(15) = f(3) = 15$

e. $f^{-1}f(-6) = f^{-1}(-30) = -6$

4 $f(x) = \sqrt[3]{x}$

d $f^{-1}(x) = x^3$

$f(-27) = -3$

$f^{-1}f(-27) = f^{-1}(-3) = -27$

e $f^{-1}(5) = 125$

$ff^{-1}(5) = f(125)$
 $= \sqrt[3]{125}$
 $= 5$

7g. $f(x) = x^2 - 3x$
 $= (x - \frac{3}{2})^2 - \frac{9}{4}$
 Domain: $x \geq \frac{3}{2}$

h. $f(x) = -x^2 + 2x + 6$

$= -(x^2 - 2x) + 6$

$= -[(x-1)^2 - 1] + 6$

$= -(x-1)^2 + 7$

D: $x \geq 1$

i. $f(x) = (x-4)^4$

D: $x \geq 4$

8 c. $f(x) = x^3 + 5, x \in \mathbb{R}$

$y = x^3 + 5$

$y - 5 = x^3$

$x = \sqrt[3]{y-5}$

$f^{-1}(x) = \sqrt[3]{x-5}$

or

$x \xrightarrow{\text{Cube}} x^3 + 5 \rightarrow x^3 + 5$

$\sqrt[3]{x-5} \xleftarrow{\sqrt[3]{\quad}} x-5 \xleftarrow{-5} x$

e. $f(x) = \frac{5x-3}{2}$

$x \xrightarrow{\times 5} 5x \xrightarrow{-3} 5x-3 \xrightarrow{\div 2} \frac{5x-3}{2}$
 $\frac{2x+3}{5} \xleftarrow{\div 5} 2x+3 \xleftarrow{+3} 2x \xleftarrow{\times 2} x$

$f^{-1}(x) = \frac{(2x+3)}{5}$

$y = \frac{5x-3}{2}$

$2y = 5x-3$

$2y+3 = 5x$

$x = \frac{2y+3}{5}$

$f^{-1}(x) = \frac{2x+3}{5}$

f $f(x) = (x-1)^2 + 6$

$f^{-1}(x) = \sqrt{x-6} + 1$

$y = (x-1)^2 + 6$

$y-6 = (x-1)^2$

$\sqrt{y-6} = x-1$

$x = 1 + \sqrt{y-6}$

gh. $f(x) = (x+2)^2 + 7, x \geq -2$

$y = (x+2)^2 + 7$

$y-7 = (x+2)^2$

$\sqrt{y-7} = x+2$

$x = -2 + \sqrt{y-7}$

$f^{-1}(x) = -2 + \sqrt{x-7}$

i. $f(x) = (2x-3)^2 - 5$

$f^{-1}(x) = \frac{\sqrt{x+5} + 3}{2}$

$y+5 = (2x-3)^2$

$\sqrt{y+5} = 2x-3$

$3 + \sqrt{y+5} = 2x$

$x = \frac{3 + \sqrt{y+5}}{2}$

j $f(x) = x^2 - 6x$

$y = (x-3)^2 - 9$

$y+9 = (x-3)^2$

$\sqrt{y+9} = x-3$

$3 + \sqrt{y+9} = x$

$f^{-1}(x) = 3 + \sqrt{x+9}$

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

$y(2x-3) = 3x-1$

$2xy-3y = 3x-1$

$2xy-3x = 3y-1$

$x(2y-3) = 3y-1$

$x = \frac{3y-1}{2y-3}$

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

\therefore self-inverse

13 $f(x) = x^2 - 4x + 3, x > 2$
 $= (x-2)^2 - 4 + 3$
 $= (x-2)^2 - 1$

a Range: $f(x) > -1$

b $f^{-1} = 2 + \sqrt{x+1}$

Domain $x > -1$

Range: $f^{-1} > 2$

14 $f(x) = \sqrt{x-2} + 3, x > 2$

a $f(x) > 3$

b $f^{-1} = (x-3)^2 + 2$

Domain: $x > 3$

Range $f^{-1} > 2$

15 $f(x) = x^2 + 2x + 6$

$= (x+1)^2 - 1 + 6$

$= (x+1)^2 + 5 \quad (-1, 5)$

Domain $x \geq -1 \quad x \leq k$

$x \leq -1 \quad k = -1$

a $f(x) \geq 5$

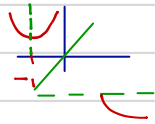
b $f(x) = (x+1)^2 + 5$

$f^{-1} = -1 \pm \sqrt{x-5}$

Domain $x-5 \geq 0$

$x \geq 5$

Range $f^{-1}(x) \geq -1$



16 $f(x) = ax + b$

$f^{-1}(x) = \frac{x-b}{a} = \frac{1}{a}x - \frac{b}{a} = 8x - 3$

$\frac{1}{a} = 8, a = \frac{1}{8} //$

$\frac{b}{a} = 3$

$b = 3(\frac{1}{8}) = \frac{3}{8} //$

17. $f(x) = px + q$

$f^{-1}(x) = \frac{x-q}{p}$

$f^{-1}(6) = 3 = \frac{6-q}{p}$

$f^{-1}(-29) = \frac{-29-q}{p} = -2$

$3p = 6 - q$

$-2p = -29 - q$

$5p = 35$

$p = 7$

$21 = 6 - q$

$q = 6 - 21 = -15$

$f^{-1}(27) = \frac{27+15}{7} = \frac{42}{7} = \underline{6}$

18. $f(x) = x^2 + x + 6 \quad x > 0 \quad y > 6$

$= (x + \frac{1}{2})^2 - \frac{1}{4} + 6$

$= (x + \frac{1}{2})^2 + \frac{23}{4}$

$f^{-1}(x) = \sqrt{x - \frac{23}{4}} - \frac{1}{2}$

Domain $x - \frac{23}{4} \geq 0$

$x \geq \frac{23}{4}$

$x > 6$

Range $f^{-1}(x) \geq -\frac{1}{2}$

$f^{-1}(x) > 0$



19 $f(x) = -2x^2 + 4x - 7 \quad x < 1$

$= -2(x^2 - 2x) - 7$

$= -2[(x-1)^2 - 1] - 7$

$= -2(x-1)^2 + 2 - 7$

$= -2(x-1)^2 - 5$

$f^{-1}(x) = -\sqrt{\frac{x+5}{-2}} + 1$

Domain $\frac{x+5}{-2} > 0$

$x+5 < 0$

$x < -5$

Range $f^{-1} < 1$