Chapter 4

Exercise 4A

1 a $y \leq 3$

  b $-1 \leq y \leq 3$

  c $y \geq -2$

2 a $y \geq 5$

  b $y \leq 6$

  c $y \geq 15$

  d $-3 \leq y \leq 3$

  e $-6 \leq y \leq 2$

  f $-4 \leq y \leq 6$

3 a $x \neq 5$

  b $x \neq -9$

  c $x > 8$

  d $x < -\frac{5}{2}$

  e $x \neq 0$

     $x \neq \frac{1}{2}$

  f $x > 5$

     $x < -5$

  g $-3 \leq x \leq 2$

  h $x < 7$

  i $x > -\frac{3}{2}$

  j $x \neq 2$

     $x \neq 1$

Exercise 4B

1 a $(x + 3)$

  b $3x + 4$

  c $3x - 3$

  d $\sin(4x)$

  e $2x + 3$

  f $3x^2 + 13$

  g $(x + 3)^2 = x^2 + 6x + 9$

  h $\cos(2x)$

2 a $(x + 3)^2$

  b $3x + 4$

  c $3x - 5$

  d $4\sin x$

  e $2x$

  f $(3x - 2)^2 + 5 = 9x^2 - 12x + 9$

  g $x^2 - 2x + 5$

  h $\sin(1 - 2x^2)$

3 $k = -\frac{1}{2}$

4 $x = -\frac{1}{3}$

5 $\frac{1}{3x-2}$

   $x \neq \frac{2}{3}$

6 a $\sqrt{3x + 1}$

     $x \geq -\frac{1}{3}$

7 a $\frac{1}{3x-4}$

     $x \neq \frac{4}{3}$

8 x

9 x

10 $\frac{5x+13}{x+2}$

11 a $\frac{1}{4x(x+3)}$

   b $x \neq 0$

      $x \neq -3$

12 a function $(3x + 1)^2 + 1$ is never less than 1 hence no real roots.

   b $k = -1$

13 $0.020106t^{\frac{2}{3}}$

14 $c(d(x)) = 2000(35 - x)$

     $r(d(x)) = x(4000 - 200x)$

     profit $= -70000 + 6000x - 200x^2$

Exercise 4C

1 a $\frac{x+1}{5}$

  b $\frac{3-x}{2}$

  c $3(x + 1)$

  d $\frac{x+7}{6}$

  e $16 - 2x$

f $\frac{7-x}{5}$

g $2x - 1$

h $4x - 1$

**2**   **a** $\frac{x+1}{7}$

     b $7\left(\frac{1+x}{7}\right) - 1 = x$

        $\frac{1+(7x-1)}{7} = x$

   **c**
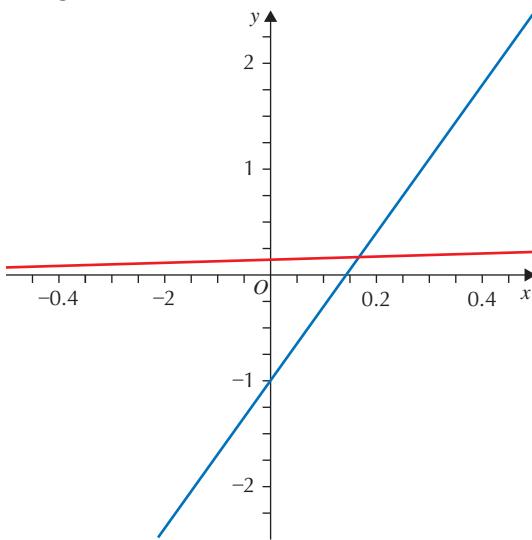
3   idiotic numbering/lettering of questions

     a   **(i)** $\frac{1}{3}(x - 2)$

         (ii)
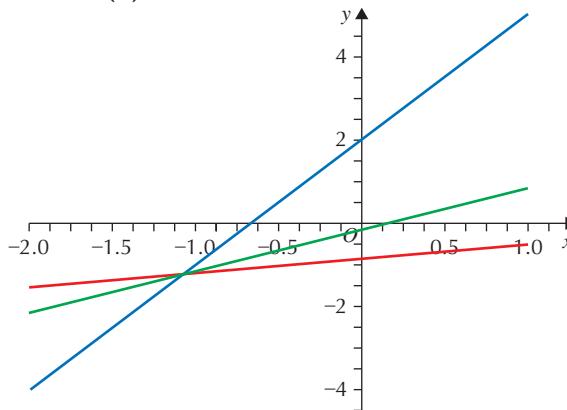
b   **(i)** $\frac{4-x}{2}$

     (ii)
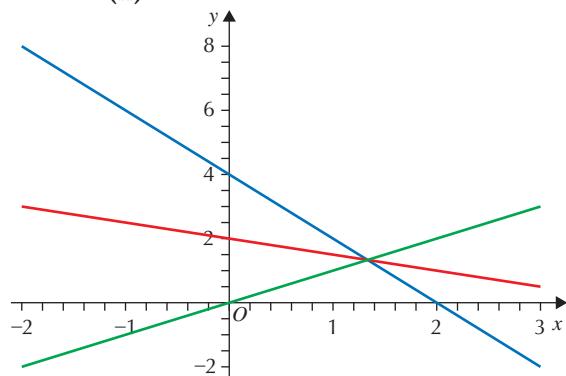
c   **(i)** $4(x + 3)$

     (ii)
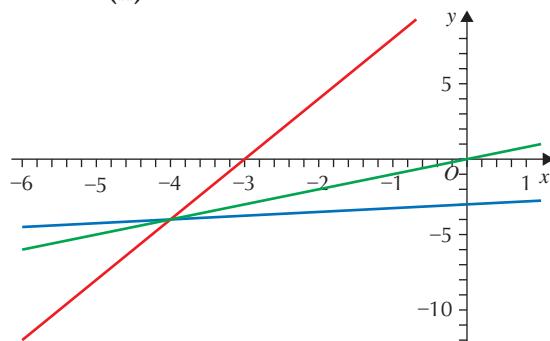
d   **(i)** $\frac{2-x}{3}$

     (ii)
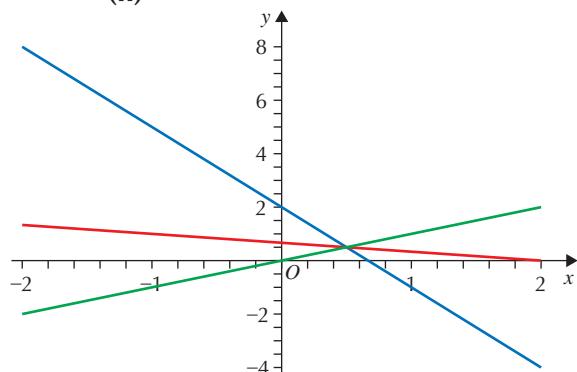
4   Inverse f = reflection of f in $y = x$

Exercise 4D

1. **a** $y > -5$

   b $y < 4$

   c $y > 2$

2. **a** $x > -3$

   b $x > 4$

   c $x > \frac{5}{2}$

3. $2^4 2^x = 16 \, 2^x$

4. $3 - 5\log_2 x$

5. $2 - 3\log_4 x$

6. $\log_2\left(8x^3\right)$