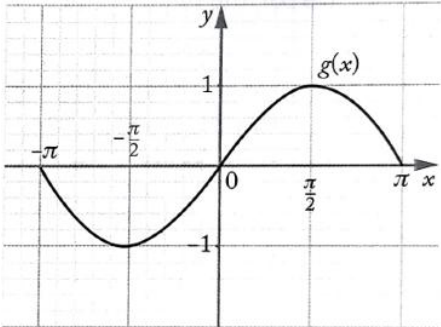


<p><b>Q1.</b> Draw a sketch of the following functions:</p> <p>(i) <math>f(x) = 2x - 3</math>      (ii) <math>g(x) = 3x^2 - 5x + 2</math>                      (iii) <math>h(x) = e^x</math>      (iv) <math>f(x) = \sin x</math>                      (v) <math>g(x) = \ln x</math>      (vi) <math>h(x) =  2x - 3 </math></p>	<p><b>Q2.</b> Use your calculator to find the couples for graphing the functions below:</p> <p>(i) <math>f(x) = x^3 - 2x^2 + 3x</math>, domain <math>-3 \leq x \leq 4</math>                      (ii) <math>g(x) = \ln(2x - 3)</math>, domain <math>3 \leq x \leq 6</math>                      (iii) <math>h(x) = 2 \sin 3\theta</math>, domain <math>-180 \leq \theta \leq 180^\circ</math></p>																
<p><b>Q3.</b> If <math>p(x) = 5x + 4</math> and <math>g(x) = 3x - 2</math>, find: (i) <math>pg(x)</math>      (ii) <math>g^2(x)</math></p>	<p><b>Q4.</b> If <math>f(x) = x - \frac{3}{2}</math> and <math>g(x) = \frac{2x-5}{3}</math>, find:                      (i) <math>fg(4)</math>      (ii) <math>gf(x)</math>      (iii) <math>f^2(x)</math></p>																
<p><b>Q5.</b> If <math>f(x) = e^{2x-1}</math> and <math>g(x) = \sqrt{x}, x \geq 0</math>, find                      (i) <math>fg(9)</math>      (ii) <math>gf(x)</math>      (iii) <math>f^{-1}g(x)</math></p>	<p><b>Q6.</b> Two functions <math>f</math> and <math>g</math> are given by:  <math>f(x) = 6x - 3</math> and <math>g(x) = 5x + q</math>.                      If <math>fg(x) = gf(x)</math>, find the value of <math>q</math>.</p>																
<p><b>Q7.</b> If <math>f(x) = 6x - 1</math>, find the value of the real number <math>p</math> such that  <math>f[x + f(x)] = p[f(x)]</math>.</p>	<p><b>Q8.</b> <math>f(x) = 3x - 5</math> and <math>g(x) = 2x + 4</math>. Solve for <math>x</math>, if <math>fg(x) = 24</math>.</p>																
<p><b>Q9.</b> If <math>f(x) = 3^x</math> and <math>g(x) = x + 2</math>, find the value of <math>x</math> for which <math>fg(x) = gf(x)</math>.</p>	<p><b>Q11.</b> Write the following in completed square form:                      (i) <math>f(x) = 9x^2 + 36x - 4</math>                      (ii) <math>g(x) = 4x^2 - 20x + 31</math></p>																
<p><b>Q10.</b> Write in completed square form:                      (i) <math>f(x) = x^2 + 8x - 3</math>      (ii) <math>g(x) = x^2 - 10x + 8</math>                      (iii) <math>h(x) = x^2 + 12x + 43</math></p>	<p><b>Q13.</b> A function <math>f</math> is defined by  <math>f: x \rightarrow x^2 - 6x + 13</math>, where <math>x \geq 3</math>.                      (i) Express <math>f(x)</math> in the form <math>(x + q)^2 + p</math>.                      (ii) Find an expression for <math>f^{-1}(x)</math> and write down its domain.                      (iii) The function <math>h</math> is defined by <math>h(x) = x - 3</math>, where <math>x \geq 2</math>. If <math>p</math> is a function such that <math>p \circ h = f</math>, find <math>p(x)</math>.</p>																
<p><b>Q12.</b>                      (i) If <math>f(x) = x^2 - 6x - 5</math>, where <math>x \geq 3, x \in R</math>, write <math>f(x)</math> in the form <math>(x - h)^2 + k</math>.                      (ii) Write down the coordinates of the minimum point and the axis of symmetry.                      (iii) Hence, sketch the graph of <math>f(x)</math>.                      (iv) Show that the inverse of <math>f(x)</math> is the function <math>f^{-1}(x) = \sqrt{x + 14} + 3</math>.</p>	<p><b>Q15.</b> The function <math>g(x)</math> is defined by  <math>g: R \rightarrow R: x \rightarrow x^2 - 2x</math>                      (i) Draw a rough sketch of this function.                      (ii) Is this function injective, surjective or bijective? Explain your answers.</p>																
<p><b>Q14.</b> The function <math>f(x)</math> is defined by  <math>f: R \rightarrow R: x \rightarrow 5x - 3</math>                      (i) Draw a rough sketch of <math>f(x)</math>.                      (ii) Is this function injective, surjective or bijective? Explain your answer.</p> <p><b>Q16.</b> The graph of a periodic function is shown below:</p>  <p>Indicate whether <math>g(x)</math> is injective, surjective or bijective. Explain your answers.</p>	<p><b>Q17.</b>                      (i) Complete the table below and use the table to draw the graph of  <math>f: R \rightarrow R^+: x \rightarrow x^2</math>                      in the interval <math>-3 \leq x \leq 3</math>.</p> <table border="1" data-bbox="874 1771 1398 1856"> <tbody> <tr> <td><math>x</math></td> <td>-3</td> <td>-2</td> <td>-1</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> </tr> <tr> <td><math>x^2</math></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>(ii) Explain why this function is surjective but not injective.                      (iii) How could the domain of <math>f(x)</math> be changed to make it an injective function?</p>	$x$	-3	-2	-1	0	1	2	3	$x^2$							
$x$	-3	-2	-1	0	1	2	3										
$x^2$																	

**Q18.** Find the inverse of the following:

(i)  $f(x) = 5x - 2, x \in R.$

(ii)  $g(x) = x^2 - 6x, x \geq 3, x \in R$

(iii)  $h(x) = 2(3^x), x \in R$

(iv)  $p(x) = \sqrt{2x - 4}$

(v) State the domain and the range of the inverse function of  $p(x)$  in part (iv).

(vi) Sketch both  $f(x)$  and  $f^{-1}(x)$  on the same graph.

**Q19.** Find the inverse of the following functions:

(i)  $f(x) = \frac{x-6}{4}$       (ii)  $g(x) = 4x + \frac{2}{3}$

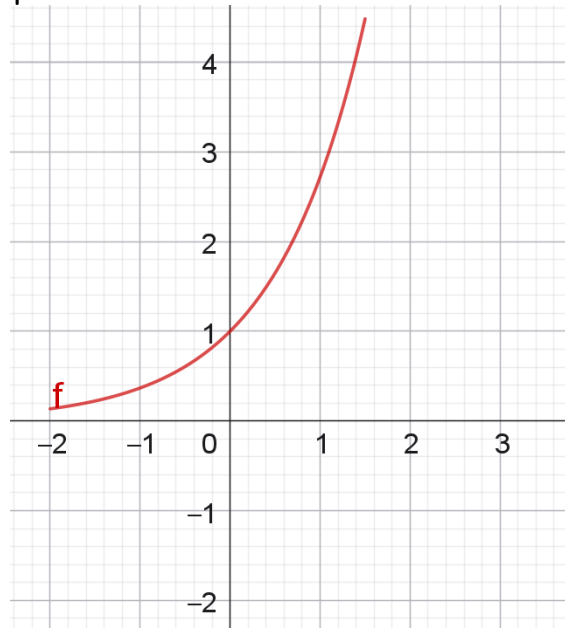
(iii)  $h(x) = \sqrt{x+4}, x \geq -4$

**Q20.** Find the inverse of the following functions and write down the range of the inverse functions:

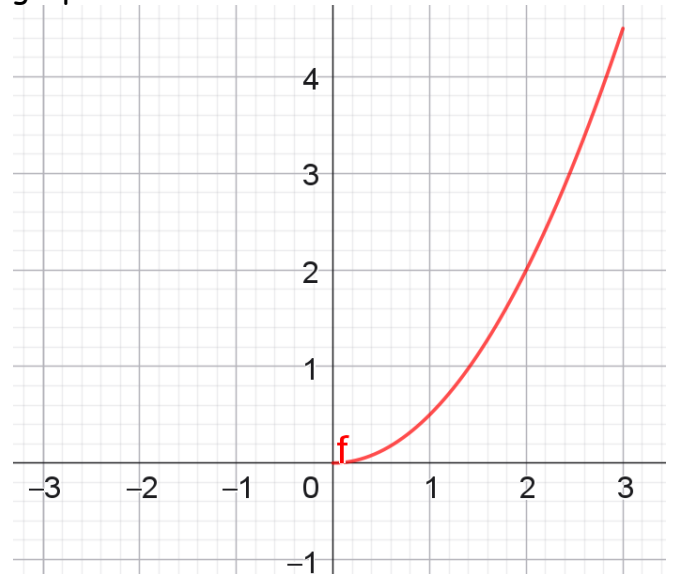
(i)  $f(x) = \sqrt{x-3}, x \in R, x \geq 3$

(ii)  $g(x) = x^3, x \in R$

**Q21.** Sketch the inverse of  $f(x)$  onto the graph below:



**Q22.** Sketch the inverse of  $f(x)$  onto the graph below:



**Answers:**

<b>Q2.</b> (i) $(-3 - 54), (-2, -22) \dots \dots \dots (4, 44)$		(ii) $(3, 1.0986), (4, 1.61), (5, 1.195), (6, 2.2)$	
(iii) $(-180, 0), (-150, -2), (-120, 0) \dots \dots \dots (150, 2), (180, 0)$			
<b>Q3.</b> (i) $15x - 6$ (ii) $9x - 8$		<b>Q4.</b> (i) $-\frac{1}{2}$ (ii) $\frac{2x-8}{3}$ (iii) $x - 3$	
<b>Q5.</b> (i) $e^{17}$ (ii) $\sqrt{e^{2x-1}}$ (iii) $\frac{1+\ln\sqrt{x}}{2}$		<b>Q6.</b> $q = -\frac{12}{5}$	<b>Q7.</b> $p = 7$
<b>Q8.</b> $x = \frac{17}{6}$			
<b>Q9.</b> $x = -1.262$	<b>Q10.</b> (i) $(x+4)^2 - 19$		(ii) $(x-5)^2 - 17$ (iii) $(x+6)^2 + 7$
<b>Q11.</b> (i) $9(x+2)^2 - 40$ (ii) $4\left(x - \frac{5}{2}\right)^2 + 6$			
<b>Q12.</b> (i) $(x-3)^2 - 14$ (ii) $(3, -14), x = 3$		(iv) $f^{-1}(x) = \sqrt{x+14} + 3$	
<b>Q13.</b> (i) $(x-3)^2 + 4$ (ii) $f^{-1}(x) = \sqrt{x-3} + 3, \text{ Domain: } x \geq 3$		(iii) $p(x) = x^2 + 4$ <b>Q14.</b> (ii) Bijective	
<b>Q15.</b> (ii) Neither injective nor surjective		<b>Q16.</b> Neither injective nor surjective	
<b>Q17.</b> (iii) Domain = $x \geq 0$ or $x \leq 0$			
<b>Q18.</b> (i) $f^{-1}(x) = \frac{x+2}{5}$ (ii) $g^{-1}(x) = 3 + \sqrt{x+9}$		(iii) $h^{-1}(x) = \frac{\log(\frac{x}{2})}{\log 3}$ (iv) $p^{-1}(x) = \frac{x^2+4}{2}$	
(v) Domain : $x \geq 0$ , Range : $y \geq 2$			
<b>Q19.</b> (i) $f^{-1}(x) = 4x + 6$ (ii) $g^{-1}(x) = \frac{3x-2}{12}$		(iii) $h^{-1}(x) = x^2 - 4$	
<b>Q20.</b> (i) Range of inverse : $x \geq 3$ (ii) Range of inverse : $x \in R$			