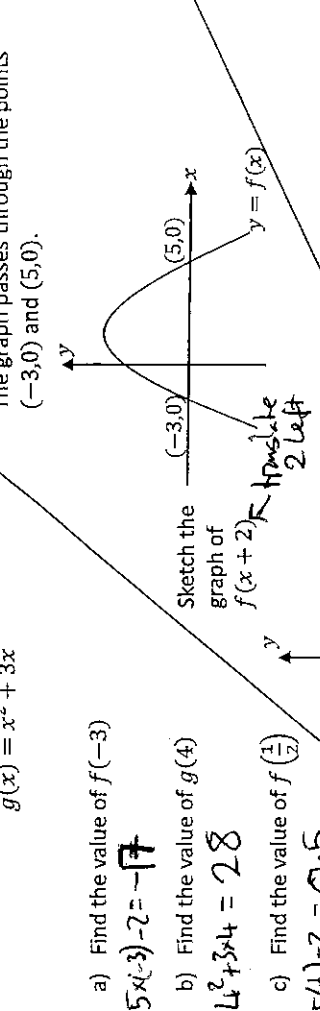


The functions $f(x)$ and $g(x)$ are given by the following:
 $f(x) = 5x - 2$
 $g(x) = x^2 + 3x$



The functions $f(x)$ and $g(x)$ are given by the following:
 $f(x) = 5x - 2$
 $g(x) = x^2 + 3x$

a) Find the value of $f(-3)$
 $5(-3) - 2 = -17$

b) Find the value of $g(4)$
 $4^2 + 3 \cdot 4 = 28$

c) Find the value of $f(\frac{1}{2})$
 $5(\frac{1}{2}) - 2 = 0.5$

The functions $f(x)$ and $g(x)$ are given by the following:
 $f(x) = 4x$
 $g(x) = 5 + 3x$

a) Calculate the value of $fg(2)$
 $fg(x) = 4(5+3x) = 20+12x$
 $fg(2) = 20+12 \cdot 2 = 44$

b) Calculate the value of $gf(-5)$
 $gf(x) = 5+3(4x) = 5+12x$
 $gf(-5) = 5+12(-5) = -55$

The functions $h(x)$ and $g(x)$ are given by the following:
 $h(x) = x^2 + 2$
 $g(x) = 2x - 3$

a) Calculate the value of $gh(3)$
 $gh(x) = 2(x^2+2) = 2x^2+4$
 $gh(3) = 2 \cdot 3^2 + 4 = 22$

b) Calculate the value of $hg(\frac{1}{2})$
 $hg(x) = (2x-3)^2 + 2 = 4x^2 - 12x + 9 + 2 = 4x^2 - 12x + 11$
 $hg(\frac{1}{2}) = 4(\frac{1}{2})^2 - 12(\frac{1}{2}) + 11 = 1 - 6 + 11 = 6$

The function $g^{-1}(x)$ is such that
 $g(x) = 5x - 4$

a) Find $g^{-1}(x)$
 $y = 5x - 4$
 $y + 4 = 5x$
 $\frac{y+4}{5} = x$
 $g^{-1}(x) = \frac{x+4}{5}$

The function h is such that
 $h(x) = Kx^2$, where K is a constant.

Given that $gh(3) = 86$

b) Work out the value of K
 $gh(x) = 5Kx^2 - 4$
 $5K \cdot 3^2 - 4 = 86$
 $5K \cdot 9 - 4 = 86$
 $45K - 4 = 86$
 $45K = 90$
 $K = 2$

The functions $f(x)$ and $g(x)$ are given by the following:
 $f(x) = 3x$
 $g(x) = 2x - 3$

Solve the equation $fg(x) = 21$
 $fg(x) = 3(2x-3) = 6x-9 = 21$
 $6x-9 = 21$
 $6x = 30$
 $x = 5$

For all values of x , $f(x) = x^2 + 1$, $h(x) = 5x^2 - 7$

a) Find the expression for $f^{-1}(x)$
 $y = x^2 + 1$
 $y - 1 = x^2$
 $\pm\sqrt{y-1} = x$
 $f^{-1}(x) = \pm\sqrt{x-1}$

b) Find an expression for $h^{-1}(x)$
 $y = 5x^2 - 7$
 $y + 7 = 5x^2$
 $\frac{y+7}{5} = x^2$
 $\pm\sqrt{\frac{y+7}{5}} = x$
 $h^{-1}(x) = \pm\sqrt{\frac{x+7}{5}}$

For all values of x , $f(x) = x^2 + 3$ and $g(x) = x^2 - 2x + 4$

a) Show that $fg(x) = (x-2)^2 + 3$
 $fg(x) = (x^2+3)(x^2-2x+4) = x^4 - 2x^3 + 4x^2 + 3x^2 - 6x + 12 = x^4 - 2x^3 + 7x^2 - 6x + 12$

b) Calculate the expression for $f^{-1}(x)$
 $y = x^2 + 3$
 $y - 3 = x^2$
 $\pm\sqrt{y-3} = x$
 $f^{-1}(x) = \pm\sqrt{x-3}$

