**Inverse Functions with Completing the Square**

Find the inverse function $f^{-1}(x)$ for each of the following functions:

(a) $f\left(x\right)=(x-2)^{2}+5$ for $x\geq 2$

(b) $f\left(x\right)=(x+3)^{2}-1$ for $x\leq -3$

(c) $f\left(x\right)=2(x-1)^{2}+3$ for $x\leq 1$

(d) $f\left(x\right)=4(x+2)^{2}-7$ for $x\geq -2$

Find the inverse function $f^{-1}(x)$ for each of the following functions:

(a) $f\left(x\right)=x^{2}+6x$ for $x\geq -3$

(b) $f\left(x\right)=x^{2}-10x+3$ for $x\leq 5$

(c) $f\left(x\right)=x^{2}+2x-5$ for $x\leq -1$

(d) $f\left(x\right)=x^{2}-8x+1$ for $x\geq 4$

Find the inverse function $f^{-1}(x)$ for each of the following functions:

(a) $f\left(x\right)=2x^{2}-8x$ for $x\geq 2$

(b) $f\left(x\right)=3x^{2}-6x+1$ for $x\leq 1$

(c) $f\left(x\right)=4x^{2}+24x-3$ for $x\geq -3$

(d) $f\left(x\right)=2x^{2}-10x+3$ for $x\leq 2.5$

The function $g(x)$ is defined as

 $g\left(x\right)=x^{2}-6x+3$ where $x\geq 3$

(a) Find the inverse function $g^{-1}(x)$ in the form $g^{-1}\left(x\right)=..$

(b) Solve $g^{-1}\left(x\right)=5$

The function $f(x)$ is defined as

 $f\left(x\right)=3x^{2}+12x-2$ where $x\leq -2$

(a) Find the inverse function $f^{-1}(x)$ in the form $f^{-1}\left(x\right)=..$

(b) Solve $f^{-1}\left(x\right)=-3$

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