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Pre Calculus

Testing Inverse with Composition

Determine whether the following are inverses of each other

1. $f(x)=3x-6,\ g(x)=\frac{1}{3}x+2$

$f\left(\frac{1}{3}x+2\right)=3\left(\frac{1}{3}x+2\right)-6$

$x+6-6$

$=x$

Yes, they are inverses of each other because $f(g(x))=x$

2. $f(x)=2x+8,\ g(x)=\frac{1}{2}x-2$

$f\left(\frac{1}{2}x-2\right)=2\left(\frac{1}{2}x-2\right)+8$

$=x-4+8$

$=x+4$

No, they are not inverses of each other because $f(g(x))\neq x$

3. $f(x)=4x-1,\ g(x)=\frac{1}{4}x+1$

$f\left(\frac{1}{4}x+1\right)=4\left(\frac{1}{4}x+1\right)-1$

$=x+4-1$

$=x+3$

No, they are not inverses of each other because $f(g(x))\neq x$

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

$f\left(\frac{2}{3}x+4\right)=\frac{3}{2}\left(\frac{2}{3}x+4\right)-6$

$=x+6-6$

$=x$

Yes, they are inverses of each other because $f(g(x))=x$

5. $f(x)=x^2+3,\ g(x)=\sqrt{x-3}$

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

$x-3+3$

$=x$

Yes, they are inverses of each other because $f(g(x))=x$

6. $f(x)=x^3-1,\ g(x)=\sqrt[3]{x+1}$

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

$=x+1-1$

$=x$

Yes, they are inverses of each other because $f(g(x))=x$

7. $f(x)=x^2-6, g(x)=\sqrt{x-6}$

$f(\sqrt{x-6})=(\sqrt{x-6})^2-6$

$=x-6-6$

$=x-12$

No, they are not inverses of each other because $f(g(x))\neq x$

8. $f(x)=2x^3+1\ g(x)=\sqrt[3]{\frac{x-1}{2}}$

$f\left(\sqrt[3]{\frac{x-1}{2}}\right)=2\left(\sqrt[3]{\frac{x-1}{2}}\right)^3+1$

$=2\left(\frac{x-1}{2}\right)+1$

$=x-1+1$

$=x$

Yes, they are inverses of each other because $f(g(x))=x$