

**Problems Domain, inverse and composition of functions**


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1) Find out the domain of the following functions:

a)  $f(x) = \frac{2x^2 - 7x}{x^2 - 1}$

b)  $f(x) = \sqrt{-x^2 + 36}$

c)  $f(x) = \frac{-5x - 4}{x - 3}$

d)  $f(x) = \sqrt{x^2 - 4}$

e)  $f(x) = \frac{5x}{x^2 + 4}$

f)  $f(x) = \sqrt{x^2 - 16}$

2) Determine the domain of the following functions:

a)  $f(x) = \log(x^2 - 16)$

b)  $f(x) = \log(x^2 + 1)$

c)  $f(x) = \frac{3x^2}{\cos x}$

d)  $f(x) = e^{4x^2 - 3}$

e)  $f(x) = \frac{-9x + 2}{\log(x - 4)}$

f)  $f(x) = \frac{27x + 1}{\sin x}$

3) Find out the domain of the following functions:

a)  $f(x) = e^{2x^2 - 2x}$

b)  $f(x) = e^{x^2}$

c)  $f(x) = \frac{27x - 8}{\log(x + 5)}$

d)  $f(x) = \frac{-7x}{\log(x - 5)}$

e)  $f(x) = \log(7x + 28)$

f)  $f(x) = \log(x^2 - 16)$

4) Find out the inverse function of the following functions:

a)  $f(x) = \sqrt[3]{7x - 6}$

b)  $f(x) = \sqrt{\frac{-9x - 3}{8x - 5}}$

c)  $f(x) = \sqrt{7x - 11}$

d)  $f(x) = \sqrt{10x + 9} + 10$

e)  $f(x) = \frac{5x + 1}{4x + 1}$

f)  $f(x) = \ln(-2x + 11)$

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5) Find out the following composite functions:

**a)**  $(g \circ f)(x)$ , **b)**  $(f \circ f)(x)$

Where:  $f(x) = x - 6$ ,  $g(x) = \sqrt{x + 10}$

6) Find out the following composite functions:

**a)**  $(f \circ g)(x)$ , **b)**  $(g \circ g)(x)$

Where:  $f(x) = x^2 + 2$ ,  $g(x) = \frac{x + 4}{x - 7}$

7) Find out the following composite functions:

**a)**  $(f \circ g)(x)$ , **b)**  $(f \circ f)(x)$

Where:  $f(x) = \frac{5x - 7}{14x - 5}$ ,  $g(x) = \frac{11x + 7}{8x + 2}$

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**Answers:**

- 1) a)  $\mathfrak{R} - \{ -1, 1 \}$       b)  $[ -6, 6 ]$   
 c)  $\mathfrak{R} - \{ 3 \}$       d)  $( -\infty, -2 ] \cup [ 2, +\infty )$   
 e)  $\mathfrak{R}$       f)  $( -\infty, -4 ] \cup [ 4, +\infty )$
- 2) a)  $( -\infty, -4 ) \cup ( 4, +\infty )$       b)  $\mathfrak{R}$   
 c)  $\mathfrak{R} - \{ (2k + 1) \pi/2 \}, k \in Z$       d)  $\mathfrak{R}$   
 e)  $( 4, 5 ) \cup ( 5, +\infty )$       f)  $\mathfrak{R} - \{ k \pi \}, k \in Z$
- 3) a)  $\mathfrak{R}$       b)  $\mathfrak{R}$   
 c)  $( -5, -4 ) \cup ( -4, +\infty )$       d)  $( 5, 6 ) \cup ( 6, +\infty )$   
 e)  $( -4, +\infty )$       f)  $( -\infty, -4 ) \cup ( 4, +\infty )$
- 4) a)  $f^{-1}(x) = \frac{x^3 + 6}{7}$       b)  $f^{-1}(x) = \frac{5x^2 - 3}{8x^2 + 9}$   
 c)  $f^{-1}(x) = \frac{x^2 + 11}{7}$       d)  $f^{-1}(x) = \frac{x^2 - 20x + 91}{10}$   
 e)  $f^{-1}(x) = \frac{-x + 1}{4x - 5}$       f)  $f^{-1}(x) = \frac{-e^x + 11}{2}$
- 5) a)  $(g \circ f)(x) = \sqrt{x + 4}$ ,      b)  $(f \circ f)(x) = x - 12$
- 6) a)  $(f \circ g)(x) = \frac{3x^2 - 20x + 114}{(x - 7)^2}$ ,      b)  $(g \circ g)(x) = \frac{-5x + 24}{6x - 53}$
- 7) a)  $(f \circ g)(x) = \frac{-x + 21}{114x + 88}$ ,      b)  $(f \circ f)(x) = x$