

Show all necessary steps Clearly, Neatly, and Systematically to receive full credit. Any incorrect statement will be penalized.

1. Find the domain of the following functions:

a) $f(x) = 4x^2 + 3$

b) $g(x) = \frac{x+5}{1-2x}$

c) $h(x) = 3|x-1| + 2$

d) $I(x) = \sqrt{3 - \frac{4}{3}x}$

2. Solve by substitution method:
$$\begin{cases} \frac{1}{3}x - \frac{1}{2}y = -5 \\ -\frac{4}{5}x + \frac{6}{5}y = 1 \end{cases}.$$

3. Johnny's grandparents gave him \$10000. He decided to invest some of the money in a saving account that pays 2% per annum and the rest in a stock fund paying 10% annum. How much should he put into each account so that his total annual interest earned from both account is 7% of his total investment? (*make sure to show in 3-steps format*)

4. Solve by elimination method:
$$\begin{cases} 0.2x = 0.4y + 1.8 \\ 0.03x + 0.05y + 0.03 = 0 \end{cases}.$$

5. Let $H(x) = \frac{2}{3}x - 4$.

a) Is the point (3 , - 2) on the graph of $H(x)$?

b) If $H(x) = -4$, what is the value(s) of x ?

c) Find the zero(s) of $H(x)$.

6. Perform indicated operation.

a) $[2a - (3b + 4c)][2a + (3b + 4c)]$

b) $(2x^2y^3 - 9xy^3 + 16x^2y) \div (2x^2y^2)$

c) $[r - (s + t)]^2$

d) $(8x + 3x^3 - 12 + 13x^2) \div \left(x - \frac{2}{3}\right)$ by synthetic division.

7. Solve:
$$\begin{cases} x - y + 3z = 2 \\ -2x + 3y - 8z = -1 \\ 2x - 2y + 4z = 7 \end{cases}$$

8. Let $f(x) = -x^2 + 2x$ and $g(x) = 4x - 3$.

a) Find $(f - g)(x)$.

b) Find $\left(\frac{f}{g}\right)(x)$.

c) Find $f(x + h)$

d) Find $(fg)(-1)$

e) Find $(f + g)(4)$

9. Perform long division: $(x^4 - 19x + 30) \div (x^2 - 6)$.

10. How much pure dye must be added to 4 gal of a 25% dye solution to make 40% dye solution? (*make sure to show in 3-steps format*)

11. Factor Completely.

a) $24a^2 + 58ab + 9b^2$

b) $54x^3y + 33x^2y - 72xy$

c) $-24m^3n - 18m^2n + 27mn$

d) $t^2 - 5t + 8$

e) $9(z + 2)^2 - 10(z + 2) + 1$

f) $r^6 - 6r^3 + 8$