

Unit 3 Test Review

Simplify by doing the indicated operation.

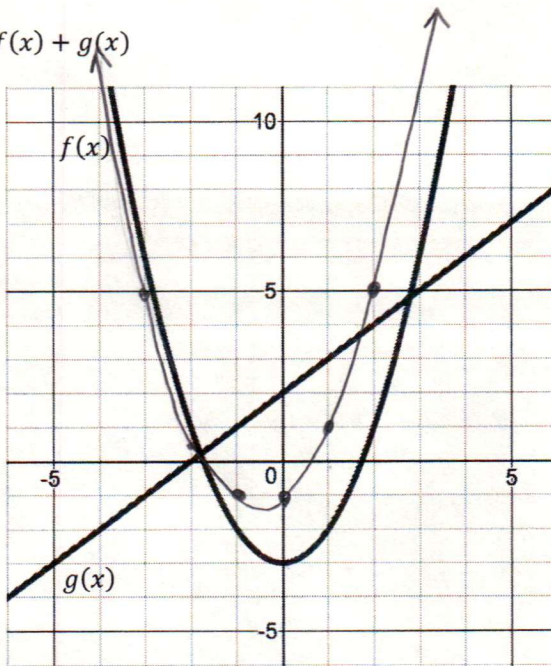
1. $(9x^2 + x - 2) + (-5x^2 - 2x + 8)$

$$4x^2 - x + 6$$

3. $(4x^2 + 3) - (x^3 - 5x + 2)$

$$-x^3 + 4x^2 + 5x + 1$$

5. $f(x) + g(x)$



2. $(15x^3 + 8x) + (2x^2 - 6x + 9)$

$$15x^3 + 2x^2 + 2x + 9$$

4. $(6x^3 + 5x^2 - 10x + 1) - (-2x^3 - 3x^2 + 3x)$

$$8x^3 + 8x^2 - 13x + 1$$

6. $(x - 3)(x^2 + 2x - 8)$

$$x^3 + 2x^2 - 8x - 3x^2 - 6x + 24$$

$$x^3 - x^2 - 14x + 24$$

7. $(2x - 7)^2$

$$(2x - 7)(2x - 7)$$

$$4x^2 - 14x - 14x + 49$$

$$4x^2 - 28x + 49$$

8. $(x - 2\sqrt{5})(x + 2\sqrt{5})$

$$x^2 + 2\sqrt{5}x - 2\sqrt{5}x - 20$$

$$x^2 - 20$$

9. $(x^3 + x + 30) \div (x - 3)$

$$\begin{array}{r|rrrr} 3 & 1 & 0 & 1 & 30 \\ & & 3 & 9 & 30 \\ \hline & 1 & 3 & 10 & 60 \end{array}$$

$$x^2 + 3x + 10 + \frac{60}{x-3}$$

11. $(x^3 - 3x^2 + 8x - 5) \div (x - 1)$

$$\begin{array}{r|rrrr} 1 & 1 & -3 & 8 & -5 \\ & & 1 & -2 & 6 \\ \hline & 1 & -2 & 6 & 1 \end{array}$$

$$x^2 - 2x + 6 + \frac{1}{x-1}$$

10. $(5x^4 + 2x^3 - 9x + 12) \div (x^2 - 3x + 4)$

$$\begin{array}{r} 5x^2 + 17x + 31 \\ x^2 - 3x + 4 \overline{) 5x^4 + 2x^3 + 0x^2 - 9x + 12} \\ \underline{5x^4 - 15x^3 + 20x^2} \\ 17x^3 - 20x^2 - 9x \\ \underline{17x^3 - 51x^2 + 68x} \\ 31x^2 - 77x + 12 \\ \underline{31x^2 - 93x + 124} \\ 16x - 112 \end{array}$$

$$5x^2 + 17x + 31 + \frac{16x - 112}{x^2 - 3x + 4}$$

Find all the roots of the given polynomial, then write the equation in factored form.

12. $f(x) = x^3 + x^2 - 4x - 4$

$(x + 2)$ is a factor

$$\begin{array}{r|rrrr} -2 & 1 & 1 & -4 & -4 \\ & & -2 & 2 & 4 \\ \hline & 1 & -1 & -2 & 0 \end{array}$$

$$x^2 - 1x - 2$$

$$(x - 2)(x + 1)$$

$$\text{Roots: } x = -2, 2, -1$$

$$f(x) = (x + 2)(x - 2)(x + 1)$$

13. $f(x) = 2x^3 + 3x^2 - 39x - 20$

$x = 4$ is a root

$$\begin{array}{r|rrrr} 4 & 2 & 3 & -39 & -20 \\ & & 8 & 44 & 20 \\ \hline & 2 & 11 & 5 & 0 \end{array}$$

$$2x^2 + 11x + 5$$

$$(2x + 1)(x + 5)$$

$$\text{Roots: } x = 4, -\frac{1}{2}, -5$$

$$f(x) = (x - 4)(2x + 1)(x + 5)$$

Use the given information to find all the other information for each polynomial.

14. Function in factored form:

$$y = 1(x-3)(x+2)x^2$$

Function in standard form:

$$y = x^4 - x^3 - 6x^2$$

End behavior:

As $x \rightarrow -\infty$: up

As $x \rightarrow \infty$: up

Roots: $x = 3, -2, 0, 0$

Value of leading coefficient: 1

Degree: 4

y-intercept: $(0, 0)$

Domain: \mathbb{R}

Range:

about

$[-16, \infty)$

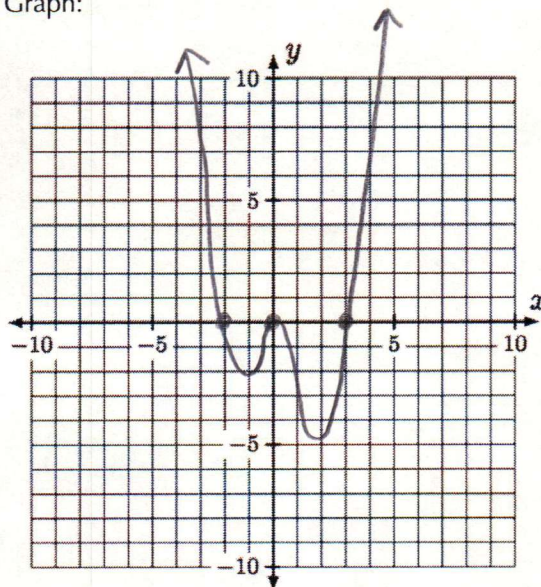
because for $x=2$,

$f(2) = -16$ which

is close

to the minimum.

Graph:



$$(x-3)(x+2)$$

$$x^2(x^2 - x - 6)$$

$$x^4 - x^3 - 6x^2$$

Use the given information to find all the other information for each polynomial.

15. Function in factored form:

$$y = -2x(x + 1)(x - 2)$$

Function in standard form:

$$y = -2x^3 + 2x^2 + 4x$$

End behavior:

As $x \rightarrow -\infty$:

As $x \rightarrow \infty$:

Roots: $x = 0, -1, 2$

Value of leading coefficient: -2

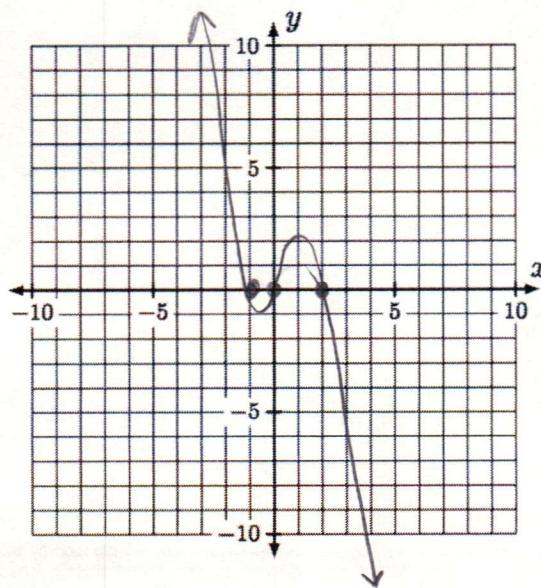
Degree: 3

y-intercept: $(0, 0)$

Domain: \mathbb{R}

Range: \mathbb{R}

Graph:



$$-2x(x+1)(x-2)$$

$$-2x(x^2 - x - 2)$$

$$-2x^3 + 2x^2 + 4x$$