

Review for Final Fall 2019

Name each polynomial by degree and number of terms.

1) $-10b - 2$

linear
binomial

2) $-4n^2$

quadratic
binomial

Simplify each expression.

3) $(2v^4 + 2v - 5v^2) - (1 + 5v^4 - v)$

$(2v^4 - 5v^2 + 2v) + (-5v^4 + v - 1)$

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

4) $(4v^2 + 4 - 6v^3) + (6v^4 - 3v^2 + 6)$

$6v^4 - 6v^3 + v^2 + 10$

Find each product.

5) $(3x + 1)(7x - 5)$

$21x^2 - 8x - 5$

6) $(2n + 3)(7n - 8)$ $14n^2 - 16n + 21n - 24$

$14n^2 + 5n - 24$

7) $(4a + 8)(a^2 + 2a - 1)$

$4a^3 + 8a^2 - 4a$

$8a^2 + 16a - 8$

$4a^3 + 16a^2 + 12a - 8$

Simplify.

8) $(2 - 4i) - (2 + 7i)$

$(2 - 4i) + (-2 - 7i)$

$0 - 11i$

$-11i$

9) $(-2 - i) + (-8 - 7i)$

$-10 - 8i$

10) $(-8 - 6i)^2$

$(-8 - 6i)(-8 - 6i)$

$64 - 96i + 36i^2$

$64 - 96i - 36$

$28 - 96i$

11) $(-5 - 4i)^2$

$(-5 - 4i)(-5 - 4i)$

Perform the indicated operation.

12) $g(a) = 4a - 3$

$h(a) = a^2 + 1$

Find $g(a) - h(a)$

$$(4a-3) - (a^2+1)$$

$$(4a-3) + (-a^2-1)$$

$$-a^2 + 4a - 4$$

13) $g(x) = 3x - 5$

$f(x) = x^2 - 2$

Find $g(x) + f(x)$

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

$$x^2 + 3x - 7$$

14) $g(a) = 3a + 2$

$f(a) = 3a - 3$

Find $g(f(a))$

$$3(3a-3) + 2$$

$$9a - 9 + 2 = 9a - 7$$

15) $h(x) = x^2 + 1$

$g(x) = 3x$

Find $h(g(x))$

$$(3x)^2 + 1$$

$$9x^2 + 1$$

Factor each completely.

16) $8a^3 + 27$

$a = \sqrt[3]{8a^3} = 2a$
 $b = \sqrt[3]{27} = 3$

$(a+b)(a^2-ab+b^2)$

$$(2a+3)(4a^2-6a+9)$$

17) $x^3 + 64$

$$(x+4)(x^2-4x+16)$$

18) $16b^3 + 12b^2 - 20b - 15$

	$4b$	3
$4b^2$	$16b^3$	$12b^2$
-5	$-20b$	-15

$$(4b^2-5)(4b+3)$$

19) $6m^3 + 42m^2 + 5m + 35$

	m	7
$6m^2$	$6m^3$	$42m^2$
5	$5m$	35

$$(6m^2+5)(m+7)$$

Solve each equation by factoring.

20) $v^2 = -10 - 7v$

$$v^2 + 7v + 10 = 0$$

$$(v+5)(v+2) = 0$$

$$v = -5 \quad v = -2$$

21) $n^2 = -3n + 28$

$$n^2 + 3n - 28 = 0$$

$$(n+7)(n-4) = 0$$

$$n = -7 \quad n = 4$$

22) $5n^2 = 22n - 21$

$$5n^2 - 22n + 21 = 0$$

$$(5n-7)(n-3) = 0$$

$$n = \frac{7}{5} \quad n = 3$$

23) $2v^2 + 9v = -9$

$$2v^2 + 9v + 9 = 0$$

$$(2v+3)(v+3) = 0$$

$$v = -\frac{3}{2} \quad v = -3$$

$$\frac{6}{9} \times \frac{18}{3}$$

	v	$+3$
$2v$	$2v^2$	$6v$
3	$3v$	9

Find all rational zeros. One zero has been given.

24) $f(x) = x^3 + 5x^2 - 9x - 45$; -3

$$\begin{array}{r|rrrr} -3 & 1 & 5 & -9 & -45 \\ & & \downarrow & -3 & -6 & 45 \\ & 1 & 2 & -15 & 0 \end{array}$$

$$x^2 + 2x - 15 = 0$$

$$(x+5)(x-3) = 0$$

$$x = -5 \quad x = 3$$

Find all zeros.

25) $f(x) = 5x^3 - 5x^2 + x - 1$

P: $\pm 1, \pm 5$
Q: $\pm 1, \pm 5$

$$\begin{array}{r|rrrr} 1 & 5 & -5 & 1 & -1 \\ & & \downarrow & 5 & 0 & 1 \\ & 5 & 0 & 1 & 0 \end{array}$$

$$5x^2 + 1 = 0$$

$$5x^2 = -1$$

$$\sqrt{x^2} = \pm \sqrt{-\frac{1}{5}}$$

$$x = 1 + i\sqrt{\frac{1}{5}}$$

P/q: $\pm 1, \pm 1/5$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

26) $-3, -4, 3$

$$(x+3)(x+4)(x-3)$$

$$(x+3)(x^2+x-12)$$

$$x^3 + 4x^2 - 9x - 36$$

27) $5, 3i, -3i$

$$(x-5)(x-3i)(x+3i)$$

$$(x-5)(x^2+9)$$

$$x^3 - 5x^2 + 9x - 45$$

Divide.

28) $(9x^3 + 24x^2 - 18x - 21) \div (x+3)$

$$\begin{array}{r|rrrr} -3 & 9 & 24 & -18 & -21 \\ & & \downarrow & -27 & 9 & 21 \\ & 9 & -3 & -9 & 0 \end{array}$$

$$9x^2 - 3x - 9 + \frac{6}{x+3}$$

29) $(p^3 + 7p^2 - p) \div (p+7)$

$$\begin{array}{r|rrrr} -7 & 1 & 7 & -1 & 0 \\ & & \downarrow & -7 & 0 & 7 \\ & 1 & 0 & -1 & 0 \end{array}$$

$$p^2 - 1 + \frac{7}{p+7}$$

Simplify each expression.

30) $\frac{n^2 - n - 30}{n^2 + 4n - 60} = \frac{(n-6)(n+5)}{(n+6)(n+10)}$

$$\frac{n+5}{n+10}$$

31) $\frac{4x-24}{x-9} \cdot \frac{x+4}{x^2-2x-24}$

$$\frac{4(x-6)}{x-9} \cdot \frac{x+4}{(x-6)(x+4)} = \frac{4}{x-9}$$

$$\frac{4}{x-9}$$

32) $\frac{m^2 + 3m - 70}{m+2} \div \frac{m^2 + 5m - 50}{m-5}$

$$\frac{m^2 + 3m - 70}{m+2} \cdot \frac{m-5}{m^2 + 5m - 50}$$

$$\frac{(m+10)(m-7)}{(m+2)} \cdot \frac{(m-5)}{(m+10)(m-5)}$$

$$\frac{m-7}{m+2}$$

34) $\frac{4(2p+1)}{(p-2)} + \frac{-6(p-2)}{(2p+1)}$

$$\frac{8p+4}{(p-2)(2p+1)} + \frac{-12p+12}{(p-2)(2p+1)}$$

$$\frac{-4p+6}{(p-2)(2p+1)}$$

LCD: (a+3)(a+4)

Solve each equation. Remember to check for extraneous solutions.

35) $\frac{1}{m^2} + \frac{1}{m} = \frac{6m-9}{m^2}$
 $1+m = 6m-9$
 $-5m = -10$
 $m = 2$

36) $\frac{a+2}{a^2+7a+12} + \frac{1}{a^2+7a+12} = \frac{2}{a+3}$
 $\frac{(a+2)}{(a+3)(a+4)} + \frac{1}{(a+3)(a+4)} = \frac{2}{(a+3)(a+4)}$
 $a+2+1 = 2(a+4)$
 $a+3 = 2a+8$
 $-a = 5$
 $a = -5$

Identify any holes in the function.

37) $f(x) = \frac{x^2 - x - 12}{x^2 - 16} = \frac{(x-4)(x+3)}{(x+4)(x-4)}$
 $y = \frac{x+3}{x+4} = \frac{4+3}{4+4}$
 $(4, \frac{7}{8})$

Identify the x-intercepts of the function.

38) $f(x) = \frac{-2x+4}{x+2}$
 $-2x+4=0$
 $x=2$
 $(2, 0)$

Identify the vertical asymptotes of each.

39) $f(x) = \frac{x^2 - x}{3x - 9}$
 $\frac{x(x-1)}{3(x-3)}$
 $x=3$

Identify the holes, vertical asymptotes, x-intercepts, and horizontal asymptote of each. Then sketch the graph.

