

Name: Key Date: _____ Block: _____

Algebra 2
Final Exam Review
Day 1 – Polynomials

Simplify completely.

1. $(x^3)^0$
1

2. $3x^5 \cdot 8x^6$
 $24x^{11}$

3. $\left(\frac{x^2 y^5 z}{2x^3}\right)^2$
 $\frac{x^4 y^{10} z^2}{4x^6} = \frac{y^{10} z^2}{4x^2}$

4. $(x^2)^{-6}$
 x^{-12} or $\frac{1}{x^{12}}$

5. $\frac{36x^7 y^5}{4x^4 y^2}$
 $9x^3 y^3$

6. $(3x^{-1} y^{-2} z^2)(3x^5 y z^4)$
 $9x^4 y^{-1} z^6 = \frac{9x^4 z^6}{y}$

7. $(-4x^4 + 3x^2 - 3x) + (-12x^4 - 3x^3 + 5x^2 - 8x + 1)$
 $-16x^4 - 3x^3 + 8x^2 - 11x + 1$

8. $(3x^2 - 7x + 4) - (+4x^2 + 12x - 8)$
 $7x^2 + 5x - 4$

9. $(3x - 7)(2x + 1)$

$6x^2 + 3x - 14x - 7$
 $6x^2 - 11x - 7$

11. $(3x - 1)^2$ $9x^2 - 6x + 1$

10. $(x - 1)(x + 3)(x + 4)$

$x^2 + 3x - x - 3$
 $(x^2 + 2x - 3)(x + 4)$
 $x^3 + 4x^2 + 2x^2 + 8x - 3x - 12$
 $x^3 + 6x^2 + 5x - 12$

Factor the following polynomials.

12.) $x^2 - 5x - 36$

$(x - 9)(x + 4)$

13.) $x^2 - 64$

$(x - 8)(x + 8)$

14.) $4x^2 - 3x - 1$

$\begin{array}{c} -4 \\ \wedge \\ 1 \quad -4 \end{array}$

$4x^2 - 4x + 1x - 1$
 $4x(x - 1) + 1(x - 1)$
 $(4x + 1)(x - 1)$

15.) $x^2 + 49$

prime

$$16.) x^3 + 5x^2 \div x + 5$$

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

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

$$17.) x^3 - 4x^2 \div -x + 4$$

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

$$(x^2-1)(x-4) = (x+1)(x-1)(x-4)$$

Divide the polynomials using BOTH long and synthetic division.

18. $(x^3 + x^2 + 2x + 24) \div (x+3)$

$$\begin{array}{r|rrrr} -3 & 1 & 1 & 2 & 24 \\ & \downarrow & -3 & 6 & -24 \\ \hline & 1 & -2 & 8 & 0 \end{array}$$

$$x^2 - 2x + 8$$

$$x+3 \overline{) x^3 + x^2 + 2x + 24}$$

$$\begin{array}{r} x^3 + 3x^2 \\ \underline{-(x^3 + 3x^2)} \\ -2x^2 + 2x \\ \underline{-(-2x^2 - 6x)} \\ 8x + 24 \\ \underline{-(8x + 24)} \\ 0 \end{array}$$

19. $(4x^3 + 52x + 15) \div (x+5)$

$$\begin{array}{r|rrrr} -5 & 4 & 0 & 52 & 15 \\ & \downarrow & -20 & 100 & -760 \\ \hline & 4 & -20 & 152 & -745 \end{array}$$

$$(x+5) \overline{) 4x^3 + 0x^2 + 52x + 15}$$

$$\begin{array}{r} 4x^3 + 20x^2 \\ \underline{-(4x^3 + 20x^2)} \\ -20x^2 + 52x \\ \underline{-(-20x^2 - 100x)} \\ 152x + 15 \\ \underline{-(152x + 760)} \\ -745 \end{array}$$

$$4x^2 - 20x + 152 + \frac{-745}{x+5}$$

Find all of the zeros of the given function using both long division and synthetic division.

20.) $f(x) = x^3 + 9x^2 - 4x - 36$; $x = 2$ is a zero

$$\begin{array}{r|rrrr} 2 & 1 & 9 & -4 & -36 \\ & \downarrow & 2 & 22 & 36 \\ \hline & 1 & 11 & 18 & 0 \end{array}$$

$$x^2 + 11x + 18$$

$$(x+2)(x+9)$$

$$\begin{array}{l} x = -2 \\ x = -9 \\ x = 2 \end{array}$$

$$(x-2) \overline{) x^3 + 9x^2 - 4x - 36}$$

$$\begin{array}{r} x^3 + 2x^2 \\ \underline{-(x^3 + 2x^2)} \\ 7x^2 - 4x - 36 \\ \underline{-(7x^2 + 14x)} \\ -18x - 36 \\ \underline{-(-18x - 36)} \\ 0 \end{array}$$

21.) $f(x) = 2x^3 + 11x^2 + 18x + 9$; $x = -3$ is a zero

$$\begin{array}{r|rrrr} -3 & 2 & 11 & 18 & 9 \\ & \downarrow & -6 & -15 & -9 \\ \hline & 2 & 5 & 3 & 0 \end{array}$$

$$2x^2 + 5x + 3$$

$$2x^2 + 2x + 3x + 3$$

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

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

$$\begin{array}{l} x = -3 \\ x = -3/2 \\ x = -1 \end{array}$$

$$x = -\frac{3}{2} \quad x = -1$$

Perform the indicated operations. Then state the domain.

Let $f(x) = x^2 - 4x + 5$ and $g(x) = x - 9$

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

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

$$d: \mathbb{R}$$

23.) $g(x) - f(x)$

$$\cancel{x-9} - x^2 + 4x - 5$$

$$-x^2 + 5x - 14$$

$$d: \mathbb{R}$$

24.) $f(x) \cdot g(x)$

$$x^3 - 4x^2 + 5x - 9x^2 + 36x - 45$$

$$x^3 - 13x^2 + 41x - 45$$

$$d: \mathbb{R}$$

25.) $f(g(x))$

$$(x-9)^2 - 4(x-9) + 5$$

$$x^2 - 18x + 81 - 4x + 36 + 5$$

$$x^2 - 22x + 122$$

$$D: \mathbb{R}$$