

## Practice Test 4

### Polynomials

For each polynomial state the degree, the leading coefficient, and the constant, and classify it as a monomial, binomial, or trinomial.

1.  $7x - 2$

Degree: \_\_\_\_\_

Leading coefficient: \_\_\_\_\_

Constant: \_\_\_\_\_

Classification: \_\_\_\_\_

2.  $4x^5y^2z$

Degree: \_\_\_\_\_

Leading coefficient: \_\_\_\_\_

Constant: \_\_\_\_\_

Classification: \_\_\_\_\_

3.  $0.43$

Degree: \_\_\_\_\_

Leading coefficient: \_\_\_\_\_

Constant: \_\_\_\_\_

Classification: \_\_\_\_\_

4.  $3a^2 + \sqrt{7}ab^4 - 2$

Degree: \_\_\_\_\_

Leading coefficient: \_\_\_\_\_

Constant: \_\_\_\_\_

Classification: \_\_\_\_\_

5. Rewrite the expression  $4x^{104} + 7x^{\sqrt{3}} - 2\sqrt{5}x^{-7} + \pi^2x$  so that it is a polynomial. You are only allowed to change two of the numbers.

Simplify.

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

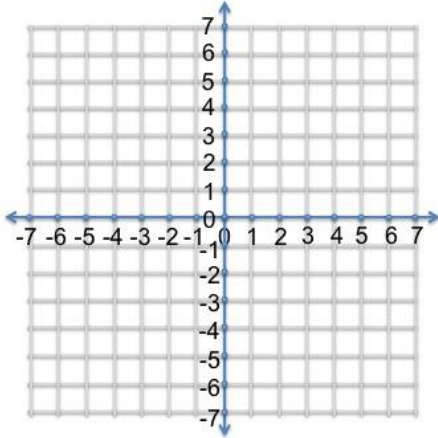
7.  $(xy - y^3) - (y^3 + xy^2 - xy)$

8.  $(6k^3j^{-2})^0 - 4(9k)^0$

9.  $7^{-1} + 2^{-2}$

10. Which number,  $-1$ ,  $5$ ,  $-\frac{1}{2}$ , or  $\frac{1}{5}$ , could not possibly be a root of the polynomial  $2x^3 - 7x^2 - 14x - 5$ ? Explain how you know.

11. Graph the function  $f(x) = -|x - 1| - 4$  and state its domain and range.



Domain:

Range:

Multiply and combine any like terms. Write your final answers without any negative exponents.

12.  $(x - 5)(x + 1)$

13.  $(3x + 5)^2$

14.  $3^{-2}(m^4n^{-1})^{-2}$

15.  $(ab)^3(b - a^2b)$

16.  $\frac{x^{-2}y^{-4}}{x^1y^{-5}}$

17.  $(3xy)^{-2}(6x^2 + 9y + 3xy)$

18. A cylindrical can has a height of  $x$  centimeters. The radius of the base of the can is 5 centimeters shorter than its height. Find a formula for the volume of the can (*the volume of a cylinder is  $V = \pi r^2 h$* ). Write your final answer as a trinomial of degree 3.

$$V(x) =$$

Factor out the GCF from each expression.

19.  $12x^4 - 6x + 18x^3$

20.  $2xy^3z^2 + x^2y^2z + 4y^2z$

Factor by grouping.

21.  $3ax + ax^2 + 9 + 3x$

22.  $4b - bc - 4ab + abc$

23. When a bullet is fired into the air at an angle of  $45^\circ$ , its height is given as a function of time by the equation  $h(t) = -x^2 + 12x + 13$  where  $h$  is the height of the bullet in feet and  $t$  is the time in seconds since the gun was fired. How many seconds after the gun was fired will the bullet hit the ground?

Factor.

24.  $x^2 - 6x + 5$

25.  $b^2 + 2b + 1$

26.  $z(2x + 3)^2 + 3z(2x + 3) + 2z$

27.  $x^2 - 9$

28.  $(xy)^3 - 27$

29.  $8y^9 + 1$

30. List five examples of rational numbers.

31. List two examples of irrational numbers.

32. a) True or false: All integers are rational numbers.

b) Explain how you know your answer from part (a) is correct.

Use the rational root theorem to list all possible rational roots for the following two polynomials. You do not have to test to see which numbers are actually roots.

33.  $2x^5 - 7x^4 + 2x - 16$

34.  $3x^{20} + x^{18} + 11$

35. According to the rational root theorem, the only possible rational roots for the polynomial  $x^3 - 3x^2 - x + 3$  are 1, -1, 3, and -3. Which of these are actually roots for the polynomial, and which are not?

Divide.

36.  $\frac{a^2+10a-24}{a+12}$

37.  $\frac{3x^3-14x^2+9x-4}{x-4}$

38. Factor the following polynomial completely (into the product of three binomials). (*Hint: Use the rational root theorem to find the first root and divide it out.*)

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

**Extra Credit:**

Where will the function  $f(x) = x^4 - 9x^2$  cross the  $x$ -axis?