

## 2.1 Number Systems and Polynomials Key

Identify all of the following number systems that each number belongs to: *natural numbers, whole numbers, integers, rational numbers, irrational numbers, real numbers, imaginary numbers, complex numbers.*

1.  $0.\overline{352}$

rational, real, complex

2.  $\sqrt{36}$

natural, whole, integer,  
rational, real, complex

3.  $-\pi$

irrational, real, complex

4.  $\sqrt{-25}$

imaginary, complex

5.  $4 - 3i$

complex

6. 0

whole, integer, rational, real, imaginary,  
complex

Determine whether the given set is closed or open under each operation. If the set is open under an operation, give an example that demonstrates this.

7. Integers

Addition: closed

Subtraction: closed

Multiplication: closed

Division: open ( $-2 \div 4 = -\frac{1}{2}$ )

8. Even Integers

Addition: closed

Subtraction: closed

Multiplication: closed

Division: open ( $6 \div 2 = 3$ )

9. Odd Integers

Addition: open ( $3 + 7 = 10$ )

Subtraction: open ( $5 - 1 = 4$ )

Multiplication: closed

Division: open ( $5 \div 3 = \frac{5}{3}$ )

10.  $11n^2 - 7$

11.  $5n^2 + 7n$

12.  $3m^2$

13.  $2m^2 + 3mp - 5p^2$

14.  $2h^3 - 12h^2 + 2h$

15.  $4y^4 + 32y^3 - 8y^2$

16.  $35m^2 - 3m - 2$

17.  $21z^3 - 15z^2 - 28z + 20$

18.  $9t^2 - 9t - 10$

19.  $y^2 - 16y + 64$

20.  $4r^2 - 12r + 9$

21.  $30x^3 + 13x^2 - 69x + 11$

22.  $12y^4 - 17y^3 - 39y^2 + 3y + 14$

23.  $3x^4 + 15x^3 - 47x^2 + 100x - 50$

24.  $2x + y + 6$

25.  $11x + 6y + 11$

26.  $15x^3 + 35x^2 - 6x - 14$

27.  $11x^2 - 5x + 17$

28.  $13s + 6$

29.  $2x + 5$

30.

Domain:  $[-6, 10]$

Range:  $[-7, 8]$

x-intercept:  $(9, 0)$

y-intercept:  $(0, 4)$

Relative maximum point(s):  $(-3, 7)$

Relative maximum value(s):  $7, 8$

Relative minimum point(s):  $(-6, 4), (0, 4), (10, -7)$

Relative minimum value(s):  $4, -7$

Absolute maximum point: n/a Value:  $8$

Absolute minimum point:  $(10, -7)$  Value:  $-7$

Positive:  $[-6, 9)$  Negative:  $(9, 10]$

Increasing:  $(-6, -3) \cup (0, 4)$

Decreasing:  $(-3, 0) \cup (7, 10)$

Constant:  $(4, 7)$

Left End Behavior: DNE

Right End Behavior: DNE