

## Descartes' Rule of Signs

**State the possible number of positive and negative zeros for each function.**

1)  $f(x) = 3x^4 + 20x^2 - 32$

2)  $f(x) = 5x^4 - 42x^2 + 49$

3)  $f(x) = 4x^3 - 12x^2 - 5x + 1$

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

5)  $f(x) = 2x^4 + 3x^2 - 54$

6)  $f(x) = x^6 - 64$

7)  $f(x) = 9x^6 - 3x^5 + 33x^4 - 11x^3 + 18x^2 - 6x$

8)  $f(x) = 64x^6 - 1$

9)  $f(x) = 2x^5 + 4x^4 + 9x^3 + 18x^2 - 35x - 70$

10)  $f(x) = 6x^5 - 4x^4 - 63x^3 + 42x^2 + 147x - 98$

$$11) f(x) = 16x^6 - 32x^4 - 25x^2 + 50$$

$$12) f(x) = x^7 - 64x$$

$$13) f(x) = x^6 - 64$$

$$14) f(x) = 8x^6 + 9x^3 + 1$$

$$15) f(x) = 27x^6 + 26x^3 - 1$$

$$16) f(x) = 27x^9 - x^6 - 27x^3 + 1$$

$$17) f(x) = 16x^8 - 73x^4 + 36$$

$$18) f(x) = 9x^8 - 106x^4 + 225$$

$$19) f(x) = x^6 - 64$$

$$20) f(x) = 16x^8 - 153x^4 + 81$$

**Critical thinking questions:**

- 21) Write a polynomial function that has 0 possible positive real zeros and 5, 3, or 1 possible negative real zero.

## Descartes' Rule of Signs

State the possible number of positive and negative zeros for each function.

1)  $f(x) = 3x^4 + 20x^2 - 32$

Possible # positive real zeros: 1

Possible # negative real zeros: 1

2)  $f(x) = 5x^4 - 42x^2 + 49$

Possible # positive real zeros: 2 or 0

Possible # negative real zeros: 2 or 0

3)  $f(x) = 4x^3 - 12x^2 - 5x + 1$

Possible # positive real zeros: 2 or 0

Possible # negative real zeros: 1

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

Possible # positive real zeros: 2 or 0

Possible # negative real zeros: 1

5)  $f(x) = 2x^4 + 3x^2 - 54$

Possible # positive real zeros: 1

Possible # negative real zeros: 1

6)  $f(x) = x^6 - 64$

Possible # positive real zeros: 1

Possible # negative real zeros: 1

7)  $f(x) = 9x^6 - 3x^5 + 33x^4 - 11x^3 + 18x^2 - 6x$

Possible # positive real zeros: 5, 3, or 1

Possible # negative real zeros: 0

8)  $f(x) = 64x^6 - 1$

Possible # positive real zeros: 1

Possible # negative real zeros: 1

9)  $f(x) = 2x^5 + 4x^4 + 9x^3 + 18x^2 - 35x - 70$

Possible # positive real zeros: 1

Possible # negative real zeros: 4, 2, or 0

10)  $f(x) = 6x^5 - 4x^4 - 63x^3 + 42x^2 + 147x - 98$

Possible # positive real zeros: 3 or 1

Possible # negative real zeros: 2 or 0

11)  $f(x) = 16x^6 - 32x^4 - 25x^2 + 50$

Possible # positive real zeros: 2 or 0  
Possible # negative real zeros: 2 or 0

12)  $f(x) = x^7 - 64x$

Possible # positive real zeros: 1  
Possible # negative real zeros: 1

13)  $f(x) = x^6 - 64$

Possible # positive real zeros: 1  
Possible # negative real zeros: 1

14)  $f(x) = 8x^6 + 9x^3 + 1$

Possible # positive real zeros: 0  
Possible # negative real zeros: 2 or 0

15)  $f(x) = 27x^6 + 26x^3 - 1$

Possible # positive real zeros: 1  
Possible # negative real zeros: 1

16)  $f(x) = 27x^9 - x^6 - 27x^3 + 1$

Possible # positive real zeros: 2 or 0  
Possible # negative real zeros: 1

17)  $f(x) = 16x^8 - 73x^4 + 36$

Possible # positive real zeros: 2 or 0  
Possible # negative real zeros: 2 or 0

18)  $f(x) = 9x^8 - 106x^4 + 225$

Possible # positive real zeros: 2 or 0  
Possible # negative real zeros: 2 or 0

19)  $f(x) = x^6 - 64$

Possible # positive real zeros: 1  
Possible # negative real zeros: 1

20)  $f(x) = 16x^8 - 153x^4 + 81$

Possible # positive real zeros: 2 or 0  
Possible # negative real zeros: 2 or 0

**Critical thinking questions:**

21) Write a polynomial function that has 0 possible positive real zeros and 5, 3, or 1 possible negative real zero.

Many answers. Ex.  $f(x) = x^5 + x^4 + x^3 + x^2 + x + 1$