CHAPTER 3.4

Real Zeros of Polynomials

Multiple-Choice Old Exam Questions

10 questions • 3 topics • options A–E • two questions per page

Topic 1 | Descartes' Rule of Signs

Counting the possible numbers of positive and negative real zeros • Questions 1–2

Q **1**

According to Descartes' Rule of Signs, $P(x) = x^6 + 3x^5 + x^3 - x - 1$ has a total of either:

A) two or four real zeros

B) four or six real zeros

C) two or four or six real zeros

D) one or five real zeros

E) one or three or five real zeros

Q **2**

Let $p(x) = x^6 + x^4 - 5x^3 + 5x - 6$. Using Descartes' Rule of Signs, if M is the maximum possible number of positive real zeros of $p(x)$ and N is the minimum possible number of negative real zeros of $p(x)$, then $M + N =$

A) 4

B) 2

C) 3

D) 6

E) 8

Topic 2 | Rational Zeros

Listing possible rational zeros and counting or finding the rational zeros • Questions 3–6

Q **3**

The number of all possible rational zeros of $p(x) = 4x^5 + 4x^4 - 37x^3 - 37x^2 + 9x + 9$ is

A) 18

B) 16

C) 14

D) 20

E) 12

Q **4**

The number of rational zeros of the polynomial $f(x) = 2x^4 - x^3 + 7x^2 - 4x - 4$ is

A) 2

B) 0

C) 1

D) 4

E) 3

Q
5

The polynomial $p(x) = 8x^3 + 8x^2 - 4x - 1$ has:

A) one rational and two irrational zeros.

B) two rational and one irrational zero.

C) three irrational zeros.

D) three rational zeros.

E) no real zeros.

Q
6

The number of rational zeros of the polynomial $p(x) = 2x^4 - 4x^3 + 3x^2 + 9x$ is

A) 4

B) 1

C) 0

D) 2

E) 3

Topic 3 | Finding Zeros and Polynomials

Finding the zeros, the intercepts or a polynomial from given information • Questions 7–10

Q **7**

The number of x-intercepts of the graph of the polynomial function $P(x) = x^5 + x^4 - 2x^3 - 2x^2 + x + 1$ is

A) 2

B) 1

C) 3

D) 4

E) 0

Q **8**

If A and B are the distinct rational zeros of the polynomial $p(x) = x^3 - 2x^2 - 4x + 8$, then $A + B =$

A) 4

B) 0

C) -4

D) -2

E) 2

Q
9

If x_1 is the largest real zero of $p(x) = 2x^3 + 7x^2 + 2x - 3$, then the value of $12x_1 + 5$ is equal to

A) 11

B) $-\frac{7}{2}$

C) $-\frac{9}{2}$

D) 41

E) 17

Q
10

If $f(x)$ is a polynomial of degree 3 with real coefficients and zeros -3, 1 and 4, and $f(2) = 30$, then $f(x) =$

A) $-3x^3 + 6x^2 + 33x - 36$

B) $-3x^3 - 2x^2 - 11x + 12$

C) $-x^3 + 2x^2 + 11x - 12$

D) $x^3 - 2x^2 - 11x + 12$

E) $3x^3 - 6x^2 - 33x + 36$

Answer Key

"Original" shows the question number in the source worksheet.

Q	Original	Ans.	Value
1	1	**A**	two or four real zeros
2	4	**A**	4
3	3	**A**	18
4	6	**A**	2
5	7	**A**	one rational and two irrational zeros.
6	8	**D**	2
7	2	**A**	2
8	9	**B**	0
9	10	**A**	11
10	5	**A**	$-3x^3 + 6x^2 + 33x - 36$