CHAPTER 3.3

Dividing Polynomials

Multiple-Choice Old Exam Questions

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

Topic 1 | Long and Synthetic Division

Dividing polynomials and writing the quotient, the remainder and the other zeros • Questions 1–4

Q **1**

If $\frac{8x^4+6x^2-3x+1}{2x^2-x+2} = Q(x) + \frac{ax+b}{2x^2-x+2}$, then $a + b =$

A) -6

B) 7

C) -8

D) 5

E) 3

Q **2**

Performing the division $\frac{2x^4-3x^2-3x+1}{x^2+x-1}$, the quotient $Q(x)$ and the remainder $R(x)$ are:

A) $Q(x) = 2x^2 - 2x + 1;\ R(x) = -6x + 2$

B) $Q(x) = 2x^2 + 2x + 1;\ R(x) = 6x + 2$

C) $Q(x) = 2x^2 + 2x - 1;\ R(x) = 6x - 2$

D) $Q(x) = 2x^2 - 2x - 1;\ R(x) = -6x - 2$

E) $Q(x) = 2x^2 - 2x;\ R(x) = -6x$

Q
3

If 3 is a zero of $f(x) = x^3 - x^2 - 4x - 6$, then the other zeros are

A) $1 \pm i$

B) $1 \pm 2i$

C) $-1 \pm 2i$

D) $2 \pm i$

E) $-1 \pm i$

Q
4

Upon dividing $x^4 + 3x^3 + x^2 - 3x + 15$ by $x + 3$, we get

A) quotient = $x^3 + x - 6$; remainder = 177

B) quotient = $x^3 - 6x - 6$; remainder = 33

C) quotient = $x^3 + x - 6$; remainder = 33

D) quotient = $x^3 - x - 6$; remainder = $\frac{33}{x+3}$

E) quotient = $x^3 + x^2 - 6$; remainder = 33

Topic 2 | The Remainder Theorem

Finding a remainder, or a constant that gives a prescribed remainder, using p(c) • Questions 5–8

Q **5**

If $f(x) = 5x^4 - 12x^2 + 2x + k$ is divided by $x - 2$ and the remainder is 28, then $k =$

A) -8

B) -36

C) -16

D) 8

E) 16

Q **6**

If $x^{55} - 8x + 1$ is divided by $x + 1$, then the remainder is

A) 6

B) 10

C) -6

D) 8

E) -8

Q
7

If $-x^3 + kx^2 - 5x - 20$ is divided by $x + 2$, then the set of all values of k that make the remainder positive is

A) $\left(\frac{1}{2}, \infty\right)$

B) $\left(\frac{11}{2}, \infty\right)$

C) $\left(\frac{9}{2}, \infty\right)$

D) $\left(\frac{19}{2}, \infty\right)$

E) $\emptyset$

Q
8

The values of k for which the remainder is -4 when $x^2 - 3x - 8$ is divided by $x + k$ are

A) $1,\ -4$

B) $-1,\ 4$

C) $1,\ 4$

D) $-1,\ -4$

E) $2,\ -2$

Topic 3 | The Factor Theorem and Zeros

Using a known zero or factor to find an unknown constant or the other zeros • Questions 9–13

Q **9**

The value of k for which -3 is a zero of the function $f(x) = -x^4 + 3x^2 - 4x + k$ is

A) 0

B) -15

C) 42

D) 39

E) -35

Q **10**

If $x - 2$ is a factor of the polynomial $x^3 - 5x^2 + 7x + k$, then k is equal to

A) 14

B) -2

C) 2

D) -42

E) 42

Q
11

The value of k for which $p(x) = x^4 + kx^3 - 3kx + 9$ is divisible by $x - 3$ is

A) 4

B) -5

C) 5

D) -4

E) 0

Q
12

If $x + 2$ is a factor of the polynomial $p(x) = x^3 - kx^2 + 3x + 7k$, then k is equal to

A) $\frac{14}{3}$

B) $\frac{11}{3}$

C) $\frac{16}{3}$

D) $\frac{10}{3}$

E) $\frac{13}{3}$

Q
13

If $x + \frac{1}{2}$ is a factor of the polynomial $p(x) = 10x^4 + 9x^3 - 4x^2 + (k + 3)x + k$, then $k =$

A) 6

B) -5

C) 12

D) $-\frac{3}{2}$

E) $\frac{5}{2}$

Answer Key

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

Q	Original	Ans.	Value
1	1	**A**	-6
2	2	**A**	$Q(x) = 2x^2 - 2x + 1;\ R(x) = -6x + 2$
3	10	**E**	$-1 \pm i$
4	7	**C**	quotient = $x^3 + x - 6$; remainder = 33
5	4	**A**	-8
6	6	**D**	8
7	3	**A**	$\left(\frac{1}{2}, \infty\right)$
8	8	**A**	$1,\ -4$
9	9	**C**	42
10	11	**B**	-2
11	12	**B**	-5
12	13	**A**	$\frac{14}{3}$
13	5	**A**	6