

ADVANCED ALGEBRA II (H)
CHAPTER 10 REVIEW

NAME _____
DATE _____ PD _____

1. How many roots does $9x - 5x^2 + x^3 - 45$ have? What are they?
2. Find a polynomial, in lowest degree, which has $1 - \sqrt{2}$, i , and $1 + 4i$ as roots.
3. Find a polynomial with rational coefficients, in lowest degree, with $1 + i$ and $2 - \sqrt{5}$ as roots.
4. Find all roots of: $100 + 4x^2 + 100x + 4x^3 + 25x^2 + x^4 = 0$
5. Find a polynomial, in lowest degree, which has $4 - \sqrt{3}$ and $9 - 2i$ as roots.
6. Find the factors of a polynomial with rational coefficients, in lowest degree, with $5 - 12i$ and $3 + \sqrt{2}$ as roots.

7. Factor completely: $x^3 - 5x^2 + 9x - 5 = 0$

8. Find all the roots of: $x^4 + x^3 + x^2 - 9x - 10 = 0$

9. Find a polynomial, in lowest degree, which has $3 - \sqrt{5}$ and $8 + 3i$ as roots.

10. Find factors of a polynomial with rational coefficients, in lowest degree, with $3 - 5i$ and $8 + \sqrt{5}$ as roots.

11. Use $P(x) = x^4 - 5x^3 + 7x^2 - 5x + 6$ to answer the following:

The roots of $P(x)$ are $i, -i, 3, 2$

a) Which of these roots, if any, are rational?

b) Which of these roots, if any, are not rational?

12. Use $P(x) = x^5 - 2x^4 - 3x^3 + 6x^2 - 4x + 8$ to answer the following:

a) How many roots does this polynomial have? How do you know?

b) Given the roots: $-2, -i$, and 2 (multiplicity 2), how many more roots does $P(x)$ have? Find them.

c) How did you find the missing root(s) in part b?

13. Factor completely: $z^3 - 5z^2 + 7z + 13 = 0$

14. Find all the roots of $x^4 - 3x^3 + 7x^2 + 21x - 26 = 0$.

15. If $P(x) = x^3 - x^2 + x - 1$ and one of the roots is equal to 1, find the other roots of $P(x)$.

16. Find a polynomial of degree 5 with -1 as a root (multiplicity 3), 0 as a root (multiplicity 1), and 4 as a root (multiplicity 1).

17. If $P(x) = x^4 - 5x^3 + 10x^2 - 20x + 24$, then find all the roots given that $2i$ is a root.

18. Find all the roots of $x^3 - 7x^2 + 17x - 15$ if $2 - i$ is one root.

19. Find all the possible rational roots of: $P(x) = x^4 + 2x^3 + 5x^2 + 34x + 30$

20. Find a polynomial of degree 3 with roots 0, 1 and i .

21. $(2x^4 + 7x^3 + x - 12) \div (x + 3)$

22. $P(x) = x^3 + 7x^2 - 12x - 3$. Find $P(-3)$, $P(-2)$, and $P(1)$.

For questions 23-25, find the roots stating the multiplicity of each.

23. $(x^2 - 7x + 12)^2 = 0$

24. $x^3(x - 1)(x + 4) = 0$

25. $-8(x - 3)^2(x + 4)^3 x^4 = 0$

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Answers to Chapter 10 Review

1. $5, 3i, -3i$
2. $p(x) = (x - i)(x - 1 - 4i)(x - 1 + \sqrt{2})$
3. $p(x) = (x - 1 + i)(x - 1 - i)(x - 2 - \sqrt{5})(x - 2 + \sqrt{5})$
4. -2 (multiplicity 2), $5i, -5i$
5. $p(x) = (x - 4 + \sqrt{3})(x - 9 + 2i)$
6. $p(x) = (x - 5 + 12i)(x - 5 - 12i)(x - 3 - \sqrt{2})(x - 3 + \sqrt{2})$
7. $(x - 1)(x - 2 - i)(x - 2 + i) = 0$
8. $-1, 2, -1 + 2i, -1 - 2i$
9. $p(x) = (x - 3 + \sqrt{5})(x - 8 - 3i)$
10. $p(x) = (x - 3 + 5i)(x - 3 - 5i)(x - 8 - \sqrt{5})(x - 8 + \sqrt{5})$
11. a) 2, 3 b) $i, -i$
12. a) $5 \rightarrow$ degree = 5 b) 1 more $\rightarrow i$ c) coefficients real
then complex solutions must be conjugates
13. $(z + 1)(z - 3 - 2i)(z - 3 + 2i) = 0$
14. $-2, 1, 2 + 3i, 2 - 3i$
15. $i, -i$
16. $p(x) = x^5 - x^4 - 9x^3 - 11x^2 - 4x$
17. $2, 3, 2i, -2i$
18. $3, 2 + i, 2 - i$
19. $\pm 1, \pm 2, \pm 3, \pm 5, \pm 6, \pm 10, \pm 15, \pm 30$
20. $p(x) = x^3 - (i + 1)x^2 + ix$
21. $2x^3 + x^2 - 3x + 10 + \frac{-42}{x + 3}$
22. $69, 41, -7$
23. 3 (multiplicity 2), 4 (multiplicity 2)
24. $1, -4, 0$ (multiplicity 3)
25. 3 (multiplicity 2), -4 (multiplicity 3), 0 (multiplicity 4)

