

Complete each problem on loose leaf paper. Write the questions, show your work, and box in your answers.

SET A

In 1–12, write each expression in simplest form.

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|------------------------------|----------------------------------|
| 1. $5x - 7x$ | 2. $4(2a + 3) - 9a$ |
| 3. $2d - (5d - 7)$ | 4. $5(b + 9) - 3b(10 - b)$ |
| 5. $x(x + 3) - 4(5 - x)$ | 6. $8 - 2(a^2 + a + 4)$ |
| 7. $7d(2d + c) + 3c(4d - c)$ | 8. $(2x - 1)(3x + 1) - 5x^2$ |
| 9. $c^2 - (c + 2)(c - 2)$ | 10. $(2x + 1)^2 - (2x + 1)^2$ |
| 11. $(-2x)^2 - 2x^2$ | 12. $4y^2 + 2y(3y - 2) - (3y)^2$ |

In 13–24, factor each polynomial completely.

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|--------------------------|------------------------------|
| 13. $2x^2 + 8x + 6$ | 14. $3a^2 - 30a + 75$ |
| 15. $5x^3 - 15x^2 - 20x$ | 16. $10ab^2 - 40a$ |
| 17. $c^4 - 16$ | 18. $3y^3 - 12y^2 + 6y - 24$ |
| 19. $x^3 + 5x^2 - x - 5$ | 20. $x^4 - 2x^2 - 1$ |
| 21. $2x^2 - 18x + 36$ | 22. $x^3 - 3x^2 + 2x$ |
| 23. $5a^4 - 5b^4$ | 24. $5x^2 + 22x - 15$ |

In 25–40, solve each equation or inequality for x . For each inequality, the solution set is a subset of the set of integers.

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|------------------------------|----------------------------|
| 25. $8x + 27 = 5x$ | 26. $3(x - 7) = 5 + x$ |
| 27. $2x - 9 < 5x - 21$ | 28. $-3 \leq 2x - 1 < 7$ |
| 29. $ 2x + 5 = 9$ | 30. $7 - x + 1 = 0$ |
| 31. $ 3 - 6y + 2 > 11$ | 32. $4 - x + 3 < 2$ |
| 33. $x^2 - 9x + 20 = 0$ | 34. $x(12 - x) = 35$ |
| 35. $x^2 + 7x + 6 < 0$ | 36. $x^2 - 2x - 35 > 0$ |
| 37. $x^2 \leq 5x$ | 38. $x(x + 3) > 0$ |
| 39. $4x^2 - 16x + 12 \leq 0$ | 40. $2x^2 + 2x - 4 \geq 0$ |

SET B

In 1–8, write each number in simplest form in terms of i .

1. $\sqrt{-1}$ 2. $\sqrt{-16}$ 3. $\sqrt{-9}$ 4. $\sqrt{-12}$
5. $\sqrt{-4} + \sqrt{-25}$ 6. $\sqrt{-18} + \sqrt{-32}$ 7. $\sqrt{-64}\left(\sqrt{-\frac{1}{4}}\right)$ 8. $\frac{\sqrt{-128}}{\sqrt{-12}}$

In 9–28, perform each indicated operation and express the result in $a + bi$ form.

9. $(2 + 3i) + (5 - 4i)$ 10. $(1 + 2i) + (-1 + i)$
11. $(2 + 7i) + (2 - 7i)$ 12. $(3 - 4i) + (-3 + 4i)$
13. $(1 + 2i) - (5 + 4i)$ 14. $(8 - 6i) - (-2 - 2i)$
15. $(7 - 5i) - (7 + 5i)$ 16. $(-2 + 3i) - (-2 - 3i)$
17. $(1 + 3i)(5 - 4i)$ 18. $(2 + 6i)(3 - i)$
19. $(9 - i)(9 - i)$ 20. $3i(4 - 2i)$
21. $\left(\frac{1}{2} - i\right)(2 + i)$ 22. $\left(\frac{1}{5} - \frac{2}{3}i\right)(1 + 2i)$
23. $\frac{2 + 2i}{2i}$ 24. $\frac{2 + 2i}{1 + i}$
25. $\frac{2 + 3i}{2 - 3i}$ 26. $\frac{1 - i}{3 - i}$
27. $(1 + 4i)^2$ 28. $(3 - 2i)^2$

In 29–36, find the roots of each equation by completing the square.

29. $x^2 - 7x + 1 = 0$ 30. $x^2 - x - 12 = 0$
31. $x^2 + 4x + 5 = 0$ 32. $x^2 - 6x - 10 = 0$
33. $x^2 - 6x + 10 = 0$ 34. $\frac{x}{12} = \frac{5}{2x + 7}$
35. $3x^2 - 6x + 6 = 0$ 36. $2x^2 + 3x - 2 = 0$

In 37–44, find the roots of each equation using the quadratic formula. Express irrational roots in simplest radical form.

37. $x^2 = x + 1$ 38. $2x^2 - 2x = 1$
39. $5x^2 = 2x + 1$ 40. $4x^2 - 12x + 13 = 0$
41. $x^3 - 2x^2 - 16x + 32 = 0$ 42. $x^4 - 5x^2 + 4 = 0$
43. $0.1x^2 + 2x + 50 = 0$ 44. $-3x^2 + \frac{1}{2}x + \frac{5}{3} = 0$