

Review Topic #3: Polynomials

Date _____

Simplify each expression.

1) $k(-2 - 4k) - 3(k + 1)$

2) $-3v(1 + 7v) - 4(2 + 3v)$

Simplify.

3) $\frac{6 + 5i}{i}$

4) $\frac{5}{-8i}$

5) $\frac{7i}{-5 + 8i}$

6) $\frac{2}{8 - 5\sqrt{5}}$

7) $\frac{-1 - i}{-3 + 7i}$

8) $(7 - 2i)(4 + 7i)$

9) $(-3 - 4i) - (5 + i)$

10) $(-1 - i) + 4 - 3$

State the number of complex zeros, the possible number of real and imaginary zeros, and the possible rational zeros for each function. Then factor each. One zero has been given.

11) $f(x) = x^4 + 8x^3 + 17x^2 - 22x - 104; -3 + 2i$

12) $f(x) = x^5 - 5x^4 - 29x^3 + 101x^2 - 62x + 222; 1 + \sqrt{38}$

13) $f(x) = x^4 + 4x^3 + 4x^2 - 16x - 32; -2 + 2i$

14) $y = x^4 - 7x^3 + 21x^2 - 23x - 52; 2 + 3i$

15) $y = x^5 + 6x^4 - 14x^3 - x^2 - 6x + 14; -3 + \sqrt{23}$

Find the discriminant of each quadratic equation then state the number and type of solutions.

16) $-7p^2 - 6p - 8 = 0$

17) $9x^2 - 7x - 1 = -3$

18) $-n^2 - 3n - 5 = -5$

Divide by factoring, long division or synthetic division.

19) $(6p^3 + 26p^2 + 12p + 16) \div (p + 4)$

20) $(7k^3 - 76k^2 + 60k) \div (k - 10)$

21) $(4m^3 - 8m^2 - 30m - 8) \div (m - 4)$

22) $(3x^3 - 31x^2 + 14x - 40) \div (x - 10)$

23) $(10x^3 - 4x^2 + 9) \div (10x - 4)$

24) $(6m^3 + 28m^2 + 10m - 8) \div (6m + 4)$

25) $(42m^2 + 13m + 6) \div (7m + 1)$

State if the given binomial is a factor of the given polynomial.

26) $(55p - p^3 - 63p^2 + p^4 + 2) \div (p - 8)$

Find all roots.

27) $x^4 + x^3 - 6x^2 = 0$

28) $x^4 - x = 0$

29) $x^4 + 14x^2 + 45 = 0$

30) $x^4 - 6x^2 + 9 = 0$

31) $x^2 + 4x + 4 = 0$

Solve each equation by factoring.

32) $7x^2 - 40x = -25$

33) $25n^2 - 40 = 90n$

Solve each equation by taking square roots.

34) $10x^2 + 3 = 163$

35) $3b^2 + 7 = 10$

36) $10b^2 - 10 = 610$

37) $3n^2 + 10 = 70$

Solve each equation with the quadratic formula.

38) $2n^2 + 10n = -8$

39) $5k^2 - 20 = 5k$

40) $5n^2 + 10 = 6n$

Answers to Review Topic #3: Polynomials (ID: 1)

- 1) $-5k - 4k^2 - 3$ 2) $-15v - 21v^2 - 8$ 3) $-6i + 5$ 4) $\frac{5i}{8}$
- 5) $\frac{-35i + 56}{89}$ 6) $\frac{-16 - 10\sqrt{5}}{61}$ 7) $\frac{-2 + 5i}{29}$ 8) $42 + 41i$
- 9) $-8 - 5i$ 10) $-i$ 11) # of complex zeros: 4
 Possible # of real zeros: 4, 2, or 0
 Possible # of imaginary zeros: 4, 2, or 0
 Possible rational zeros:
 $\pm 1, \pm 2, \pm 4, \pm 8, \pm 13, \pm 26, \pm 52, \pm 104$
 Factors to: $f(x) = (x - 2)(x + 4)(x^2 + 6x + 13)$
- 12) # of complex zeros: 5
 Possible # of real zeros: 5, 3, or 1
 Possible # of imaginary zeros: 4, 2, or 0
 Possible rational zeros:
 $\pm 1, \pm 2, \pm 3, \pm 6, \pm 37, \pm 74, \pm 111, \pm 222$
 Factors to: $f(x) = (x - 3)(x^2 + 2)(x^2 - 2x - 37)$
- 13) # of complex zeros: 4
 Possible # of real zeros: 4, 2, or 0
 Possible # of imaginary zeros: 4, 2, or 0
 Possible rational zeros:
 $\pm 1, \pm 2, \pm 4, \pm 8, \pm 16, \pm 32$
 Factors to: $f(x) = (x - 2)(x + 2)(x^2 + 4x + 8)$
- 14) # of complex zeros: 4
 Possible # of real zeros: 4, 2, or 0
 Possible # of imaginary zeros: 4, 2, or 0
 Possible rational zeros:
 $\pm 1, \pm 2, \pm 4, \pm 13, \pm 26, \pm 52$
 Factors to: $y = (x - 4)(x + 1)(x^2 - 4x + 13)$
- 15) # of complex zeros: 5
 Possible # of real zeros: 5, 3, or 1
 Possible # of imaginary zeros: 4, 2, or 0
 Possible rational zeros: $\pm 1, \pm 2, \pm 7, \pm 14$
 Factors to: $y = (x - 1)(x^2 + x + 1)(x^2 + 6x - 14)$
- 16) -188 ; two imaginary solutions 17) -23 ; two imaginary solutions
- 18) 9; two real solutions 19) $6p^2 + 2p + 4$ 20) $7k^2 - 6k$
- 21) $4m^2 + 8m + 2$ 22) $3x^2 - x + 4$ 23) $x^2 + \frac{9}{10x - 4}$
- 24) $m^2 + 4m - 1 - \frac{2}{3m + 2}$ 25) $6m + 1 + \frac{5}{7m + 1}$ 26) No
- 27) $\{0 \text{ mult. } 2, -3, 2\}$ 28) $\left\{0, 1, \frac{-1 + i\sqrt{3}}{2}, \frac{-1 - i\sqrt{3}}{2}\right\}$ 29) $\{3i, -3i, i\sqrt{5}, -i\sqrt{5}\}$
- 30) $\{\sqrt{3} \text{ mult. } 2, -\sqrt{3} \text{ mult. } 2\}$ 31) $\{-2 \text{ mult. } 2\}$ 32) $\left\{\frac{5}{7}, 5\right\}$
- 33) $\left\{-\frac{2}{5}, 4\right\}$ 34) $\{4, -4\}$ 35) $\{1, -1\}$ 36) $\{\sqrt{62}, -\sqrt{62}\}$
- 37) $\{2\sqrt{5}, -2\sqrt{5}\}$ 38) $\{-1, -4\}$ 39) $\left\{\frac{1 + \sqrt{17}}{2}, \frac{1 - \sqrt{17}}{2}\right\}$
- 40) $\left\{\frac{3 + i\sqrt{41}}{5}, \frac{3 - i\sqrt{41}}{5}\right\}$