MATHS

BOOKS - MTG IIT JEE FOUNDATION

POLYNOMIALS

Illustrations

1. Find the zeroes of the polynomial x^2-3 and verify the relationship between the zeroes and the coefficients.

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2. Find a quadratic polynomial, the sum and product of whose zeroes are - 3 and 2 respectively.

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3. Find the zeroes of the polynomial $f(x) = x^3 - 9x^2 - 16x + 144$, if its two zeroes are equal in magnitude but opposite in sing.

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4. If divisor is $x^2 + 1 - x$ and dividend is $x^4 + 3x^2 + 4x - 5$, then find the remainder.

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5. Divide $6x^3 - 26x - 21 + x^2$ by $-7 + 3x$.

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6. If f(x) is divided by g(x), then find remainder. When $f(x) = x^4 - 5x + 6, g(x) = -x^2 + 1$

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7. If the remainder on division of $x^3 + x^2 + kx - 8$ by x-4 is 16, then find the quotient and the value of k.

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Solved Examples

1. If $x = 4/3$ is a zero of the polynomial $f(x) = 6x^3 - 11x^2 + kx - 20$, then find the value of k.

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2. If $p(y) = y^6 - 3y^4 + 2y^2 + 6$ and $q(y) = y^5 - y^3 + 2y^2 + y - 6$, find $p(y) + q(y)$ and $p(y) - q(y)$.

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3. Find the zerose of the quadratic polynomial $x^2 + 7x + 10$ and verify the relationship between the zeroes and the

coefficients.

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4. Verify that $3, -1, -1/3$ are the zeroes of the cubic polynomial $p(x) = 3x^3 - 5x^2 - 11x - 3$ and then verify the relationship between the zeroes and the coeffcients.

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5. Find the zeroes of the quadratic polynomial $2x^2 + x = 15$ and and verify a relationship between the zeroes and its coefficients.

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6. Verify that the numbers given along the side of the cubic polynomial are its zeroes. Also verify the relationship between the zeroes and the coefficients.

$x^3 + 6x^2 + 11x + 6, \ -2, \ -3, \ -1$

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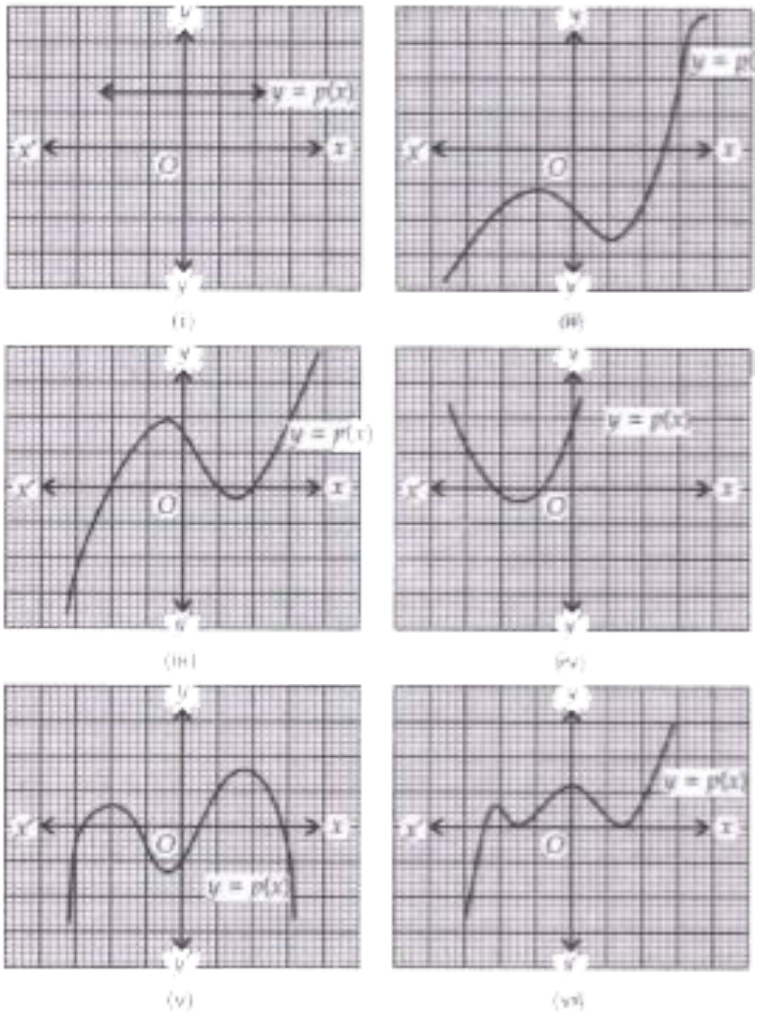
Ncert Section Exercise 2 1

1. The graphs of y = p(x) are given in the below figures, for some polynomials p(x). Find the number of zeroes of p(x), in

each case.



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Ncert Section Exercise 2 2

1. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients $x^2 - 2x - 8$

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2. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients $4s^2 - 4s + 1$

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3. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients $6x^2 - 3 - 7x$

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4. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients $4u^2 + 8u$

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5. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients $t^2 - 15$

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6. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients $3x^2 - x - 4$

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7. Find a quadratic polynomial each with the given numbers as sum and product of its zeroes respectively.

$1/4, \ -1$

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8. Find a quadratic polynomial each with the given numbers as sum and product of its zeroes respectively.

$\sqrt{2}, 1/3$

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9. Find a quadratic polynomial each with the given numbers as sum and product of its zeroes respectively.

$0, \sqrt{5}$

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10. Find a quadratic polynomial each with the given numbers as sum and product of its zeroes respectively.

1,1

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11. Find a quadratic polynomial each with the given numbers as sum and product of its zeroes respectively.

$-1/4, 1/4$

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12. Find a quadratic polynomial each with the given numbers as sum and product of its zeroes respectively.

4,1

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Ncert Section Exercise 2 3

1. Divide the polynomial p(x) by the polynomial g(x) and find the quotient and remainder in each of the following :

$p(x) = x^3 - 3x^2 + 5x - 3, g(x) = x^2 - 2$

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2. Divide the polynomial p(x) by the polynomial g(x) and find the quotient and remainder in each of the following :

$p(x) = x^4 - 3x^2 + 4x + 5, g(x) = x^2 + 1 - x$

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3. Divide the polynomial p(x) by the polynomial g(x) and find the quotient and remainder in each of the following :

$p(x) = x^4 - 5x + 6, g(x) = 2 - x^2$

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4. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial :$t^2 - 3, 2t^4 + 3t^3 - 2t^2 - 9t - 12$

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5. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial :$x^2 + 3x + 1, 3x^4 + 5x^3 - 7x^2 + 2x + 2$

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6. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial :$x^3 - 3x + 1, x^5 - 4x^3 + x^2 + 3x + 1$

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7. Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$

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8. On dividing $\left(x^3 - 3x^2 + x + 2\right)$ by a polynomial g(x), the quotient and remainder are (x-2) and (-2x+4) respectively. Find g(x).

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9. Give examples of polynomials p(x), g(x), 9(x) and r(x), which satisfy the division algorithm and

deg p(x) = deg q(x)

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10. Give examples of polynomials p(x), g(x), 9(x) and r(x), which satisfy the division algorithm and

deg q(x)= deg r(x)

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11. Give examples of polynomials p(x), g(x), 9(x) and r(x), which satisfy the division algorithm and

deg r(x)=0

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Ncert Section Exercise 2 4

1. Verify that the numbers given alongside of the cubic polynomials below are their zeroes. Also verify the relationship between the zeroes and the coefficients in each case :

$2x^3 + x^2 - 5x + 2, 1/2, 1, -2$

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2. Verify that the numbers given alongside of the cubic polynomials below are their zeroes. Also verify the relationship between the zeroes and the coefficients in each case :

$x^3 - 4x^2 + 5x - 2, 2, 1, 1$

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3. Find a cubic polynomial with the sum, sum of the products of its zeros taken two at a time, and product of its zeros as $2, \ -7, \ -14$ respectively.

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4. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a\ \ b, \ a, \ a\ \ + \ b$, find a and b.

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5. If two zeros of the polynomial $f(x) = x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{3}$, find other zeros.

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6. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be (x-a). Find k and a.

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Exercise Multiple Choice Questions Level 1

1. Which of the following is not a polynomial?

A. $\sqrt{3}x^2 - 2\sqrt{3} + 3$

B. $\frac{3}{2}x^3 - 5x^2 - \frac{1}{\sqrt{3}}x - 1$

C. $x + \frac{1}{x}$

D. $5x^2 - 3x + \sqrt{2}$

Answer:

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2. If $p(y) = 3y^4 - 5y^3 + y^2 + 8$, then p(-1) will be

A. 2

B. 15

C. 17

D. -17

Answer: C

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3. Degree of polynomial $y^3 - 2y^2 - \sqrt{3}y + \frac{1}{2}$ is

A. $1/2$

B. 2

C. 3

D. 4

Answer:

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4. Polynomials $ax^3 + 3x^2 - 3$ and $2x^3 - 5x + a$ when divided by (x-4) leave the same remainder. Find the value of a.

A. 1

B. -1

C. 2

D. -2

Answer:

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5. The sum and product of the zeroes of a quadratic polynomial are 2 and - 15 respectively. The quadratic polynomial is

A. $x^2 - 2x + 15$

B. $x^2 - 2x - 15$

C. $x^2 + 2x - 15$

D. $x^2 + 2x + 15$

Answer:

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6. One zero of the quadratic polynomial $2x^2 - 8x - m$ is $\frac{5}{2}$; determine the other zero.

A. $\frac{2}{3}$

B. $-\frac{2}{3}$

C. $\frac{3}{2}$

D. $\frac{-15}{2}$

Answer:

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7. If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - x - 4$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$.

A. $\frac{15}{4}$

B. $-\frac{15}{4}$

C. 4

D. 15

Answer:

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8. If α, β, γ are the zeros of the polynomial $2x^3 + x^2 - 13x + 6$ then $\alpha\beta\gamma$= ?

A. 3

B. -3

C. $-\frac{1}{2}$

D. $\frac{-13}{2}$

Answer:

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9. If α, β, γ be the zeros of the polynomial p(x) such that $(\alpha+\beta+\gamma)=3, (\alpha\beta+\beta\gamma+\gamma\alpha)=-10$ and $\alpha\beta\gamma=-24$ then p(x) = ?

A. $x^3+3x^2-10x+24$

B. $x^3+3x^2+10x-24$

C. $x^3-3x^2-10x+24$

D. None of these

Answer:

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10. The value of k such that the quadratic polynomial $x^2 - (k+6)x + 2(2k+1)$ has sum of the zeroes as half of their product, is

A. 2

B. 3

C. -5

D. 5

Answer:

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11. If α and β are the zeros of the quadratic polynomial $f(t) = t^2 - 4t + 3$, find the value of $\alpha^4\beta^3 + \alpha^3\beta^4$.

A. 104

B. 108

C. 112

D. 5

Answer:

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12. If the polynomials $2x^3 + ax^2 + 3x - 5$ and $x^3 + x^2 - 4x + a$ leave the same remainder when divided by $x - 2$, find the value of a.

A. 2

B. -2

C. 3

D. -3

Answer:

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13. One of the factors of $\left(a^2-b^2\right)\left(c^2-d^2\right)-4abcd$ is

A. $ac-bd+bc+ad$

B. $ac-bd+bc-ad$

C. cannot be determined

D. None of these

Answer:

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14. If one zero of the polynomial $f(x) = \left(k^2 + 4\right)x^2 + 16x + 4k$ is reciprocal of the other, then k is equal to

A. 2

B. -2

C. 1

D. -1

Answer:

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15. If α, β are the zeros of the polynomial $f(x) = x^2 - p(x+1) - c$ such that $(\alpha+1)(\beta+1) = 0$, then $c =$ (a) 1 (b) 0 (c) -1 (d) 2

A. 1

B. 0

C. -1

D. 2

Answer:

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16. If the sum of squares of zeros of the polynomial $x^2 - 8x + k$ is 40, find the value of k.

A. 10

B. 12

C. 14

D. 16

Answer:

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17. The graph of $y = x^3 - 4x$ cuts x-axis at (-2,0), (0,0) and (2,0). The zeroes of $x^3 - 4x$ are

A. 0,0,0

B. $-2, 2, 2$

C. $-2, 0, 2$

D. $-2, \ -2, 2$

Answer:

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18. The graph of the polynomial p(x) cuts the x-axis at 2 places and touches it at 4 places. The number of zeroes of p(x) is

A. 2

B. 6

C. 4

D. 8

Answer:

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19. If the sum of the zeros of the quadratic polynomial $f(t) = kt^2 + 2t + 3k$ is equal to their product, find the value of k.

A. $-2/3$

B. $2/3$

C. $1/3$

D. $-1/3$

Answer:

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20. The zeroes of the quadratic polynomial $100x^2 + 50x + 99$ are

A. both negative

B. both positive

C. one positive, one negative

D. can't say

Answer:

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21. If α, β, γ are the zeroes of the polynomial $f(x) = 2x^3 + 6x^2 - 4x + 9$, find the value of $\frac{1}{\alpha\beta} + \frac{1}{\beta\gamma} + \frac{1}{\gamma\alpha}$

A. $2/3$

B. $1/3$

C. $4/3$

D. zero

Answer:

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22. If $\alpha and \beta$ ar the zeros of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, find the value of

k.

A. $\alpha\beta = 6$

B. $\alpha^2 + \beta^2 = 13$

C. k=6

D. All of these

Answer:

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23. If the polynomial $6x^4 + 8x^3 + 17x^2 + 21x + 7$ is divided by another polynomial $3x^2 + 4x + 1,$ the remainder comes out to be $ax + b$, find $aandb$.

A. a=2

B. a=1

C. b=1

D. b=3

Answer:

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24. If α, β be the zeroes of the quadratic polynomial $f(x) = x^2 + px + 45$ and $(\alpha - \beta)^2 = 144$, then p is equal to

A. $p = \pm 12$

B. $p = \pm 16$

C. $p = \pm 18$

D. $p = \pm 14$

Answer:

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25. If α, β, γ are the zeroes of the polynomial $f(x) = x^3 - 5x^2 - 2x + 24$ such that $\alpha\beta = 12$, then

A. $\alpha + \beta = 7$

B. $\alpha - \beta = \pm 1$

C. $\gamma = -2$

D. All of these

Answer: D

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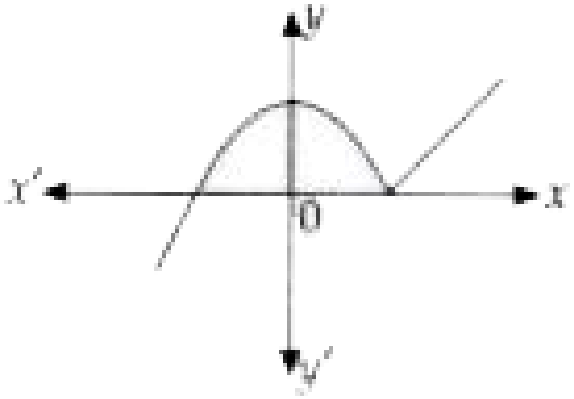
26. The graph of y = p(x) is given below. Find the number of zeroes of p(x).



A. 1

B. 2

C. 3

D. All of these

Answer:

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27. If (x+1) is a factor of $2x^3 + ax^2 + 2bx + 1$, then find the value of a and b given that 2a-3b=4.

A. 1

B. 2

C. 3

D. All of these

Answer:

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28. Which of the following graphs has more than three distinct real roots?

A. 

B. 

C. 

D. 

Answer:

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29. If two of the zeroes of the polynomial $p(x) = 5x^4 - 5x^3 - 33x^2 + 3x + 18$ are $\sqrt{\frac{3}{5}}$ and $-\sqrt{\frac{3}{5}}$ find the other two zeroes.

A. 3,2

B. $-3, 2$

C. $3, -2$

D. $-3, -2$

Answer:

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30. Find the value of k such that the equation $x^2 - (k+6)x + 2(2k-1) = 0$ has sum of the roots equal

to half of their product :

A. $-2/7$

B. $4/7$

C. $2/7$

D. 0

Answer:

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31. If α and β are the zeroes of the quadratic polynomial $x^2 - (k+6)x + 2(2k+1)$ find a polynomial whose zeroes are $2\alpha - 1$ and $2\beta - 1$

A. $x^2 + 4x + 11$

B. $x^2 - 4x - 11$

C. $x^2 - 4x - 11$

D. $x^2 - 4x + 11$

Answer:

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32. If sum of the squares of zeroes of the quadratic polynomial $p(x) = x^2 - 10x + 2k$ is 28, find the value of k.

A. 18

B. 14

C. 16

D. 20

Answer:

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33. If two zeroes of the polynomial $f(x) = x^3 - 3x^2 - 12x + 36$ are $2\sqrt{3}$ and $-2\sqrt{3}$ then find its third zero.

A. 2

B. 4

C. 1

D. 3

Answer:

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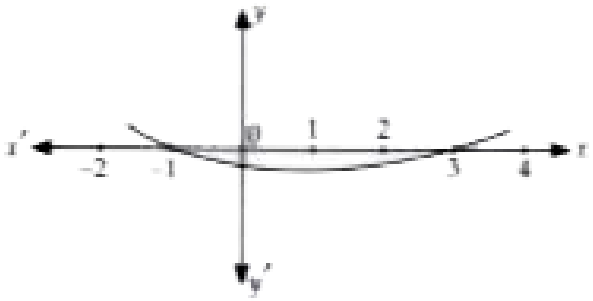
34. The graph of a polynomial is given below.



Find the algebraic expression for this curve.

A. $x^2 + 2x - 3$

B. $x^2 + 2x + 3$

C. $x^2 - 2x - 3$

D. $x^2 - 2x + 3$

Answer:

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35. For the polynomial $p(x) = \frac{1}{2}x^2 - 3x + 2$, find the difference of zeroes.

A. $\pm 2\sqrt{3}$

B. $\pm 2\sqrt{5}$

C. $\pm 2\sqrt{2}$

D. $\pm 3\sqrt{5}$

Answer:

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Exercise Multiple Choice Questions Level 2

1. The expression that should be subtracted from $4x^4 - 2x^3 - 6x^2 + x - 5$ so that it may be exactly divisible by $2x^2 + x - 2$ is

A. $-3x - 5$

B. $3x - 5$

C. $-3x + 5$

D. $3x + 5$

Answer:

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2. If two zeroes of the polynomial $x^4 + x^3 - 9x^2 - 3x + 18$ are $\sqrt{3}$ and $-\sqrt{3}$, then the other zeroes are

A. $-3, 2$

B. $-3, \ -2$

C. 3,2

D. $-2, 3$

Answer:

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3. If $\alpha and \beta$ are the zeros of the quadratic polynomial $f(x) = kx^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 24$, find the value of k.

A. k=1

B. k=-1

C. $k = 2/3$

D. both (b) and (c)

Answer:

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4. If α and β are the zeros of the quadratic polynomial $p(x) = 4x^2 - 5x - 1$, find the value of $\alpha^2\beta + \alpha\beta^2$.

A. $\alpha^2\beta + \alpha\beta^2 = -\frac{5}{16}$

B. $\alpha^2 + \beta^2 = \frac{33}{16}$

C. $\frac{1}{\alpha} + \frac{1}{\beta} = -5$

D. All of these

Answer:

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5. If the polynomial $f(x) = ax^3 + bx - c$ is divisible by the polynomial $g(x) = x^2 + bx + c$, then $ab =$ (a) 1 (b) $\frac{1}{c}$ (c) -1 (d) $-\frac{1}{c}$

A. $c = 2b^2$

B. ab=1

C. ac=2b

D. All of these

Answer:

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6. If the quadratic polynomial p(x) is divisible by x - 4 and 2 is a zero of p(x) then find the polynomial p(x).

A. $x^2 + 6x + 8$

B. $x^2 - 6x + 8$

C. $x^2 + x + 8$

D. $x^2 - x + 8$

Answer:

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7. If α and β are the zeroes of $f(x) = ax^2 + bx + c$, then find $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2}$

A. $\frac{b^2 - 2ac}{a^2c^2}$

B. $\frac{(b^2 - 2ac) - ac}{a^2c^2}$

C. $\frac{(b^2 - 2ac)^2 - 2a^2c^2}{a^2c^2}$

D. None of these

Answer:

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8. Find the value of a and b so that the polynomial $p(x) = x^4 + x^3 + 8x^2 - ax + b$ is exactly divisible by $x^2 - 1$.

A. a=1, b=9

B. a=1, b=-9

C. a=2, b=1

D. a=-2, b=-1

Answer:

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9. On dividing $x^3 - 2x^2 + x - 2$ by a polynomial g(x), the quotient and remainder were x - 2 and - 2x + 4 respectively. Find g(x).

A. $x^2 + 3$

B. $x^2 + 3x$

C. $x^2 - 3$

D. $x^2 - 3x$

Answer:

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10. If (x + a) is a factor of two polynomials $x^2 + px + q$ and $x^2 + mx + n$, then a is equal to

A. $(n + q) / (m - p)$

B. $(n - q) / (m - p)$

C. $(n - q) / (m + p)$

D. None of these

Answer:

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11. The quotient obtained on dividing $8x^4 - 2x^2 + 6x - 7$ by 2x+1 is $4x^3 + px^2 - qx + 3$ then value of (q-p) is

A. 0

B. -2

C. 2

D. 4

Answer:

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12. State 'T' for true and 'F' for false and select the correct option.

I. If a quadratic polynomial f(x) is a square of a linear

polynomial, then its two zeroes are coincident.

II. If a quadratic polynomial f(x) is not factorisable into linear factors, then it has no real zero.

III. If graph of quadratic polynomial $ax^2 + bx + c$ cuts positive direction of y-axis, then the sign of c is positive.

IV. If fourth degree polynomial is divided by a quadratic polynomial, then the degree of the remainder is 2.

A. $\begin{matrix} I & II & III & IV \\ F & F & T & T \end{matrix}$

B. $\begin{matrix} I & II & III & IV \\ T & T & T & F \end{matrix}$

C. $\begin{matrix} I & II & III & IV \\ F & T & T & F \end{matrix}$

D. $\begin{matrix} I & II & III & IV \\ T & T & T & T \end{matrix}$

Answer:

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13. What must be subtracted from the polynomial $f(x) = x^4 + 2x^3 - 13x^2 - 12x + 21$ so that the resulting polynomial is exactly divisible by $x^4 - 4x + 3$?

A. 2x-1

B. 2x+1

C. 2x+3

D. 2x-3

Answer:

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14. If α, β, γ are the zeroes of the polynomial $x^3 + px^2 + qx + r$, then find $\frac{1}{\alpha\beta} + \frac{1}{\beta\gamma} + \frac{1}{\gamma\alpha}$

A. $\frac{p}{r}$

B. $-\frac{p}{r}$

C. $\frac{q}{r}$

D. $-\frac{q}{r}$

Answer:

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15. If α, β are the zeroes of the polynomial $x^2 - p(x+1) - q$, then $(\alpha+1)(\beta+1) =$

A. q-1

B. 1-q

C. q

D. 1+q

Answer:

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Exercise Match The Following

1. List-II gives zeroes (not necessary all) of the polynomials given in List-I, match them correctly.

List-I		List-II	
(P)	$4 - x^2$	(1)	7
(Q)	$x^3 - 2x^2$	(2)	-2
(R)	$6x^2 - 3 - 7x$	(3)	0
(S)	$-x + 7$	(4)	3/2

A. P-1, Q-2, R-3, S-4

B. P-2, Q-4, R-3, S-1

C. P-2, Q-3, R-4, S-1

D. P-1, Q-3, R-4, S-2

Answer:

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2. If α and β are the zeroes of the polynomial $2x^2 - 4x + 5$ then match the value of List-I with that of List-II.

List-I		List-II	
(P)	$\frac{1}{\alpha} + \frac{1}{\beta}$	(1)	-6
(Q)	$(\alpha - \beta)^2$	(2)	$\frac{-4}{25}$
(R)	$\frac{1}{\alpha^2} + \frac{1}{\beta^2}$	(3)	$\frac{-2}{5}$
(S)	$\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$	(4)	$\frac{4}{5}$

A. P-4, Q-1, R-2, S-3

B. P-4, Q-2, R-1, S-3

C. P-1, Q-2, R-3, S-4

D. P-1, Q-4, R-2, S-3

Answer:

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Exercise Assertion Reason Type Directions

1. Assertion : $2 + 5x^{3/2} + 7x^2$ not a polynomial.

Reason : The highest exponent of a variable in the polynomial is called its degree.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer:

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2. Assertion : The zeroes of the polynomial $5x^5 - 20x^4 + 5x^3 + 50x^2 - 20x - 40$ are 1 and 3.

Reason : x=r is a zero of a polynomial p(x), if it is a solution of the equation P(x) = 0.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer:

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3. Factorize: $\frac{3}{2}x^2 - 8x - \frac{35}{2}$.

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4. Assertion: $5x^5 + 9x^4 + 8x^3 + 4x + 1$ is a biquadratic polynomial.

Reason : A polynomial of degree 4 is a biquadratic polynomial.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer:

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5. Assertion : If α and $B\eta$ are the zeroes of the polynomial $x^2 + 2x - 15$ then $\frac{1}{\alpha} + \frac{1}{\beta}$ is $\frac{2}{15}$.

Reason : If α and $B\eta$ are the zeroes of a quadratic polynomial $ax^2 + bx + c$ then $\alpha + \beta = -\frac{b}{a}$ and $\alpha\beta = \frac{c}{a}$

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If assertion is false but reason is true.

Answer: A

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Exercise Comprehension Type Passage I

1. Sum of zeroes $= \alpha + \beta = -8$ and product of zeroes $= \alpha\beta = 6$

A polynomial whose zeroes are, $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ is

A. $6x^2 + 8x + 1$

B. $6x^2 - 8x - 1$

C. $6x^2 - 4x + 6$

D. `6x^(2)-8x+1

Answer:

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2. Sum of zeros $\alpha + \beta = -8$ and product of zeros $\alpha \cdot \beta = 6$ .Form a polynomial whose zeros are $\frac{1}{\alpha^2}$ and $\frac{1}{\beta^2} is$

A. $x^2 - 13x + 1$

B. $36x^2 - 52x + 1$

C. $x^2 + 13x + 9$

D. $36x^2 + 52x - 1$

Answer:

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3. If sum of zeroes of a polynomial $= \alpha + \beta = -8$ and product of zeroes $= \alpha\beta = 6$, then form a polynomial whose zeroes are $(\alpha - \beta)$ and $(\alpha + \beta)$.

A. $x^2 - \left(8 \pm 2\sqrt{10}\right)x + 16\sqrt{10}$

B. $x^2 - \left(8 \pm 2\sqrt{10}\right)x - 16\sqrt{10}$

C. $x^2 + \left(8 \pm 2\sqrt{10}\right)x + 16\sqrt{10}$

D. $x^2 + \left(8 \pm 2\sqrt{10}\right)x - 16\sqrt{10}$

Answer:

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Exercise Comprehension Type Passage Ii

1. $If\alpha$ and β be the zeros of the polynomial $ax^2 + bx + c$, then the value of $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}}$

A. b

B. $\frac{-b}{\sqrt{a}c}$

C. $-\frac{\sqrt{b}}{ac}$

D. $\frac{1}{ac}$

Answer:

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2. If α and β be the zeroes of the polynomial $ax^2 + bx + c$, then the value of

$\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ is

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3. If α and β be the zeroes of the polynomial $ax^2 + bx + c$, then the value of

$\frac{1}{\alpha} + \frac{1}{\beta}$ is

A. $\frac{-b}{ac}$

B. b=ac

C. $\frac{-b}{c}$

D. $-\sqrt{\frac{b}{ac}}$

Answer:

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Exercise Subjective Problems Very Short Answer Type

1. Find the zeroes of the quadratic polynomial $9x^2 = 5$.

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2. Find the sum and product of the zeroes of the following quadratic polynomial $x^2 - (c - ab)x - abc$

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3. One zero of the quadratic polynomial $8x^2 - 18x - m$ is $\frac{5}{2}$. Find the value of m.

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4. If $x = 2$ and $x = 0$ are roots ofthe polynomial $f(x) = 2x^3 - 5x^2 + ax + b$. Find the values of a and b

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5. If $f(x) = x^2 - 2x - 3$, then find the zeroes of f(x).

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6. Divide $3x^3 + x^2 + 2x + 5$by $1 + 2x + x^2$.

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7. Show that x=2 is a zero of $2x^3 + x^2 - 7x - 6$.

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8. If $f(x) = 2x^3 - 13x^2 + 17x + 12$, then find the value of f(-2) and f(3).

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9. $f(x) = x^2 - 10x + 25$. Find the zeroes of f(x).

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10. Show that x+1 and 2x-3 are factors of $2x^3 - 9x^2 + x + 12.$

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Exercise Subjective Problems Short Answer Type

1. Find the zeroes of the quadratic polynomial $6x^2 - 12x + 6$ and verify the relation between the zeroes and its coefficients.

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2. If α and β be the zeroes of the polynomial $p(x) = x^2 - 5x + 2$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta} - 3\alpha\beta$.

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3. Check whether $(x^2 - 11x + 28)$ is a factor of the polynomial $x^3 - 12x^2 + 39x - 28$.

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4. Find a quadratic polynomial whose sum of zeroes and product of zeroes are respectively

(i) $\frac{1}{4}, \frac{1}{2}$ (ii) $2, \frac{1}{3}$

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5. Find a cubic polynomial with the sum of its zeroes, sum of the products of its zeroes taken two at a time and product of its zeroes as 2, -5 and - 11 respectively.

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6. Find the cubic polynomial with the sum of its zeroes, sum of the products of its zeroes taken two at a time and product of its zeroes as 0, -7 and - 6 respectively.

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7. Find α and β if x+1 and x+2 are factors of $p(x) = x^3 + 3x^2 - 2\alpha x + \beta$.

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8. If $ax^3 + bx + c$ has a factor of the form $x^2 + px + 1$, show that $a^2 - c^2 = ab$.

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9. Find all zeroes of the polynomial $x^3 - 5x^2 - 16x + 80$, if two zeroes of the polynomial are 4 and - 4.

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10. Obtain all the zeroes of $x^3 - 7x + 6$ if one of its zeroes is 1

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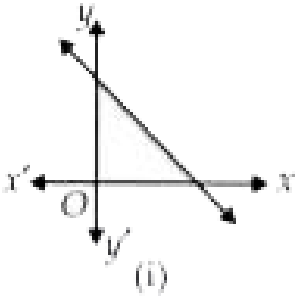
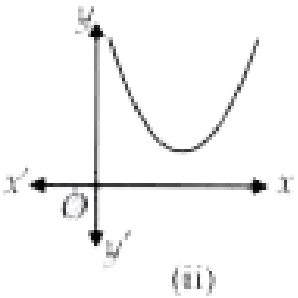
Exercise Subjective Problems Long Answer Type

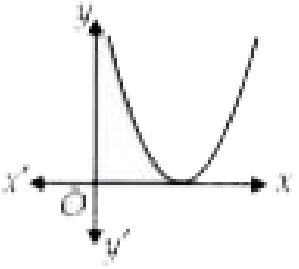
1. Which of the following correspond to the graph to a linear or a quadratic polynomial and find the number of zeroes of polynomial.



(i)



(ii)



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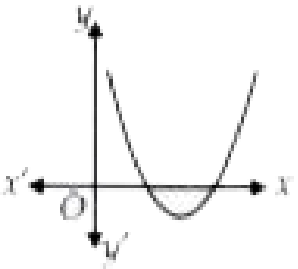

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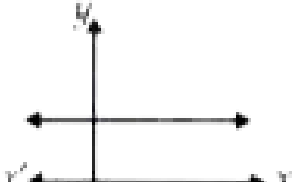
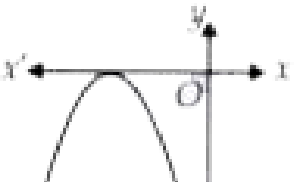
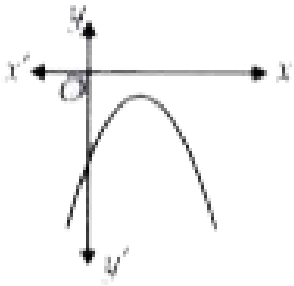


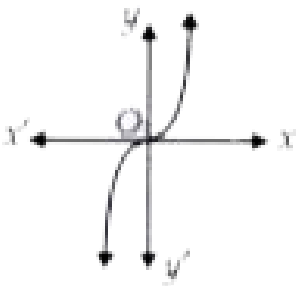


(v)

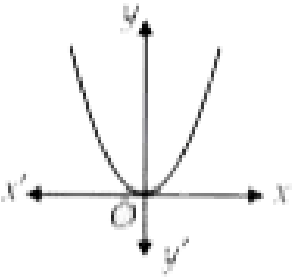
(vi)



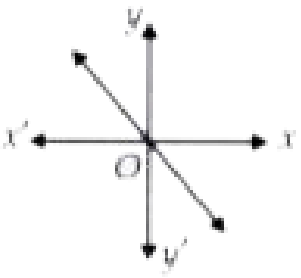
(vii)



(viii)



(ix)



(x)

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2. If p and q are zeroes of $2x^2 + 2(m+n)x + m^2 + n^2$, form the quadratic polynomial whose zeroes are $(p+q)^2$ and $(p-q)^2$.

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3. If α and β are the zeroes of the polynomial $x^2 + 4x + 3 = 0$,find the polynomial whose zeroes are $1 + \frac{\beta}{\alpha}$ and $1 + \frac{\alpha}{\beta}$

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4. Obtain all the zeroes of $x^4 + 2x^3 - 7x^2 - 8x + 12$, if two of its zeroes are 2 and -2.

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Exercise Subjective Problems Integer Numerical Value Type

1. Twice the product of the zeroes of the polynomial $23x^2 - 26x + 161$ is 14p. Find p.

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2. Zeroes of a quadratic polynomial are in the ratio 2 : 3 and their sum is 15. The product of zeroes of this polynomial is

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3. The graph of a polynomial p(x) cuts the x-axis at two places and touches it at the three places. Find the number of zeroes of p(x).

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4. The sum and product of zeroes of $p(x) = 63x^2 - 7x - 9$ are S and P respectively. Find the value of 27 S + 14P.

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5. If α, β, γ are zeroes of cubic polynomial $x^3 + 5x - 2$, then find the value of $\alpha^3 + \beta^3 + \gamma^3$.

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6. If $p(x) = 2x^2 - 3x + 4$, then value of p(-1).

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7. Find the value of m, if (x-2) is a factor of $2x^3 - 5x^2 + 5x - m$.

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8. If the polynomial $6x^4 + 8x^3 + 17x^2 + 25x - 9$ is divided by another polynomial $3x^2 + 4x + 1$, the remainder comes out to be a+bx, find $(a + b)^2$.

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9. A polynomial of degree 7 is divided by a polynomial of degree 4. Degree of the quotient is

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10. If $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$, then find 5a+2b.

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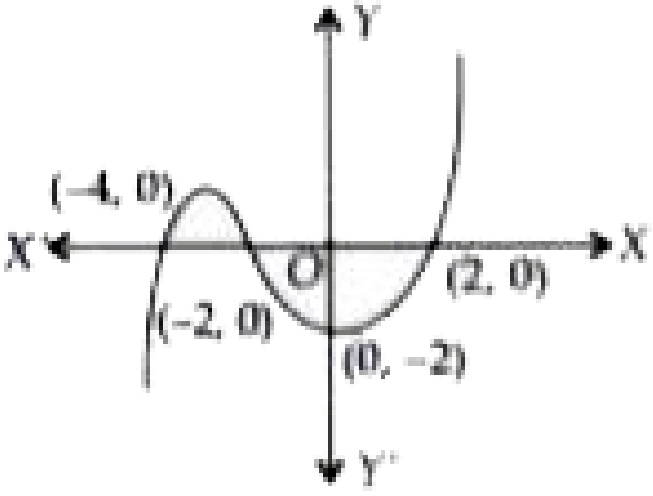
Olympiad Hots Corner

1. The number of zeroes for the given graph is



A. 3

B. 2

C. 4

D. 1

Answer:

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2. If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is -1, then the product of the other two zeroes is

A. b-a+1

B. b-a-1

C. a-b+1

D. a-b-1

Answer:

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3. The sum of the remainders obtained when $\{x^3 + (k+8)x + k\}$ is divided by $(x-2)$ or when it is divided by $(x+1)$ is zero. Find the value of k.

A. 3

B. -2

C. -4

D. 8

Answer:

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4. Let $p(x) = x^2 + bx + c$, where b and c are integers. If p(x) is a factor of both $x^4 + 6x^2 + 25$ and $3x^4 + 4x^2 + 28x + 5$, find the value of p(1).

A. 0

B. 1

C. 2

D. 4

Answer:

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5. If α and β are the zeros of the quadratic polynomial $p(s) = 3s^2 - 6s + 4$, find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + 2\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) + 3\alpha\beta$.

A. 5

B. 8

C. $10/3$

D. $1/2$

Answer:

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6. If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - 3x - 2$, find a quadratic polynomial whose zeros are $\frac{1}{2\alpha + \beta}$ and $\frac{1}{2\beta + \alpha}$.

A. $20x^2 + 9x + 1$

B. $20x^2 - 9x - 1$

C. $20x^2 - 9x + 1$

D. $20x^2 + 9x - 1$

Answer:

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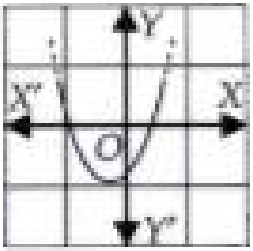
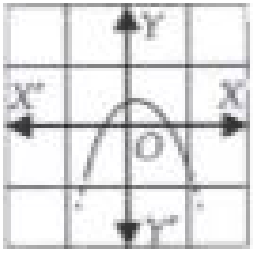
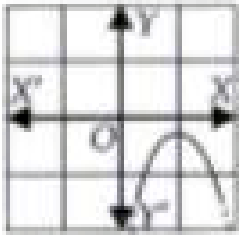
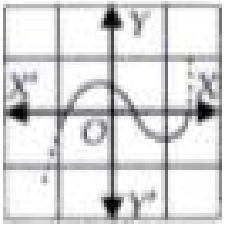
7. Which of the following is not the graph of a quadratic polynomial?

A. 

B. 

C. 

D. 

Answer: $C : D$

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8. Find the value of k, for which the polynomial $p(x) = x^{100} + 2x^{99} + k$ is exaclty divisible by (x+1).

A. 1

B. 0

C. -1

D. -3

Answer:

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9. If α, β be the zeroes of the polynomial $2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then k=?

A. 3

B. -3

C. 2

D. -2

Answer: k=2

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10. H.C.F. and L.C.M. of two polynomials are x and $\left(x^2 + 3x\right)$, respectively. If one polynomial is $\left(x^2 + 3x\right)$, then second will be

A. $\left(x^2+3x\right)$

B. $\left(x^2-9x\right)$

C. $\left(x^2+9x\right)$

D. x

Answer:

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11. If α, β, γ are the zeros of the polynomial $f(x)=ax^3+bx^2+cx+d$, then $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=$ (a) $\frac{b}{d}$ (b) $\frac{c}{d}$ (c) $\frac{c}{d}$ (d) $\frac{c}{a}$

A. $-\frac{b}{c}$

B. $\frac{c}{d}$

C. $-\frac{c}{d}$

D. $-\frac{c}{a}$

Answer:

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12. What should be added in the polynomial $x^3 - 6x^2 + 11x + 8$ so that it is completely divisible by $x^2 - 3x + 2$?

A. 2

B. -2

C. 14

D. -14

Answer:

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13. For which values of a and b, the zeroes of $q(x) = x^3 + 2x^2 + a$ are also the zeroes of the polynomial $p(x) = x^5 - x^4 - 4x^3 + 3x^2 + 3x + b$? Which zeores of $p(x)$ are not the zeroes of $p(x)$?

A. $-1, \frac{1}{2}$

B. $-1, 2$

C. $-1, -\frac{1}{2}$

D. 1,2

Answer:

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14. If the zeroes of the polynomial $f(x) = x^3 - ax^2 + bx + c$ are in arithmetic progression, then

A. $a^3 + 9ab + 27c = 0$

B. $2a^3 - 9ab - 27c = 0$

C. $3a^3 + 9ab - 27c = 0$

D. $a^3 - 9ab + 27c = 0$

Answer:

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15. If the polynomial $8x^4 + 14x^3 - 2x^2 + px + q$ is exactly divisible by $4x^2 + 3x - 2$, then the values of p and q respectively are

A. 2 and 0

B. -7 and 2

C. 5 and -3

D. 4 and -1

Answer: B

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