Date: 28/9/2021

Q1. Give examples of polynomials $p(x)$, $g(x)$, $q(x)$ and $r(x)$, which satisfy the division algorithm and

$$\deg p(x) = \deg q(x)$$

Q2. Divide $2x^2 + 3x + 1$ by $x + 2$.

Q3. Give examples of polynomials $p(x)$, $g(x)$, $q(x)$ and $r(x)$, which satisfy the division algorithm and

$$\deg r(x) = 0$$

Q4. Give examples of polynomials $p(x)$, $g(x)$, $q(x)$ and $r(x)$, which satisfy the division algorithm and

$$\deg q(x) = \deg r(x)$$

Q5. Find a quadratic polynomial, the sum and product of whose zeroes are -3 and 2, respectively.

Q6. Find the zeroes of the polynomial $x^2 - 3$ and verify the relationship between the zeroes and the coefficients.

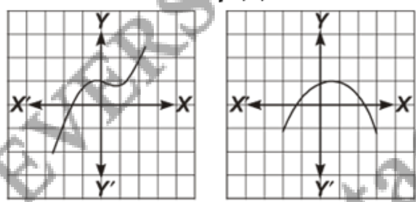
Q7. Divide $3x^3 + x^2 + 2x + 5$ by $1 + 2x + x^2$.

Q8. Verify that $3, -1, -\frac{1}{3}$ 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 coefficients.

Q9. Find the zeroes of the quadratic polynomial $x^2 + 7x + 10$, and verify the relationship between the zeroes and the coefficients.

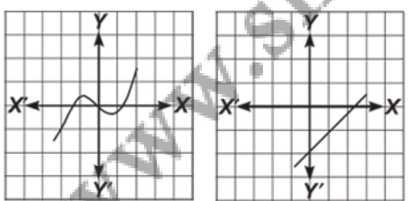
Q10. Divide $3x^2 - x^3 - 3x + 5$ by $x - 1 - x^2$, and verify the division algorithm.

Q11. Look at the graph (see figure) given below. Each is the graph of $y = p(x)$, where $p(x)$ is a polynomial. For each of the graphs, find the number of zeroes of $p(x)$.



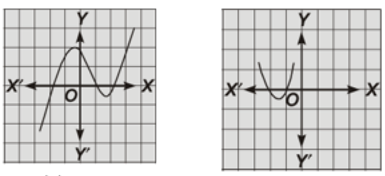
(i) (ii)

Q12. Look at the graph (see figure) given below. Each is the graph of $y = p(x)$, where $p(x)$ is a polynomial. For each of the graphs, find the number of zeroes of $p(x)$.



(i) (ii)

Q13. The graphs of $y = p(x)$ are given in figure below, for some polynomials $p(x)$. Find the number of zeros of $p(x)$, in each case.



(i) (ii)

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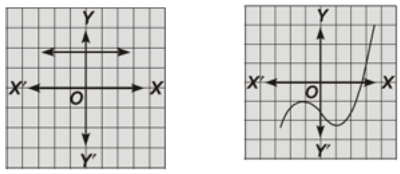
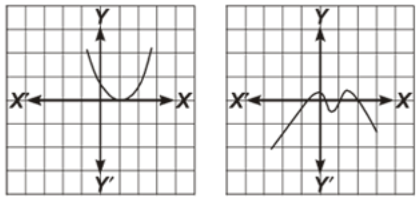
Q14. The graphs of $y = p(x)$ are given in figure below, for some polynomials $p(x)$. Find the number of zeros of $p(x)$, in each case.



(i) (ii)

Q15. Look at the graph (see figure) given below. Each is the graph of $y = p(x)$, where $p(x)$ is a polynomial. For each of the graphs, find the number of zeroes of $p(x)$.



(i) (ii)

Q16. Divide the polynomial $p(x)$ by the polynomial $g(x)$ and find the quotient and remainder :

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

Q17. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial:

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

Q18. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial:

$$x^2 + 3x + 1, \quad 3x^4 + 5x^3 - 7x^2 + 2x + 2$$

Q19. Divide the polynomial $p(x)$ by the polynomial $g(x)$ and find the quotient and remainder :

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

Q20. Divide the polynomial $p(x)$ by the polynomial $g(x)$ and find the quotient and remainder :

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

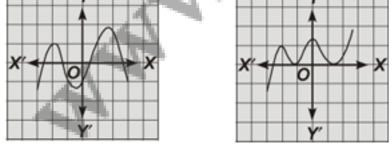
Q21. Find a quadratic polynomial each with the given numbers as the sum and product of its zeros respectivety.

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

Q22. Find a quadratic polynomial each with the given numbers as the sum and product of its zeros respectivety.

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

Q23. The graphs of $y = p(x)$ are given in figure below, for some polynomials $p(x)$. Find the number of zeros of $p(x)$, in each case.



(i) (ii)

Q24. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial $g(x)$, the quotient and reminder were $x - 2$ and $-2x + 4$, respcetively. Find $g(x)$.

Q25. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients.

(i) $x^2 - 2x - 8$ (ii) $4u^2 + 8u$

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Q26. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a - b, a, a + b$, find a and b.

Q27. Find a cubic polynomial with the sum, sum of the product of its zeroes taken two at a time, and the product of its zeroes as 2, – 7, – 14 respectively.

Q28. Check whether the first polynomial is a factor of the second polynomial by dividing the second polynomial by the first polynomial:

$$t^2 - 3, \quad 2t^4 + 3t^3 - 2t^2 - 9t - 12$$

Q29. Find a quadratic polynomial each with the given numbers as the sum and product of its zeros respectivety.

(i) $\sqrt{2}, \frac{1}{3}$ (ii) $0, \sqrt{5}$

Q30. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients.

(i) $6x^2 - 3 - 7x$ (ii) $3x^2 - x - 4$

Q31. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients.

(i) $4s^2 - 4s + 1$ (ii) $t^2 - 15$

Q32. 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:

$$2x^3 + x^2 - 5x + 2; \quad \frac{1}{2}, 1, -2$$

Q33. 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:

$$x^3 - 4x^2 + 5x - 2; \quad 2, 1, 1$$

Q34. If two zeroes of the polynomial $x^4 - 6x^3 - 26x^2 + 138x - 35$ are $2 \pm \sqrt{3}$, find other zeroes.

Q35. Obtain all other zeroes of $3x^4 + 6x^3 - 2x^2 - 10x - 5$, if two of its zeroes are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

Q36. Find all the zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$, if you know that two of its zeroes are $\sqrt{2}$ and $-\sqrt{2}$.

Q37. 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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S1. $p(x) = 2x^2 - 2x + 14,\ g(x) = 2,\ q(x) = x^2 - x + 7,\ r(x) = 0.$

S2. Quotient = $2x - 1$.
Remainder = 3.

S3. $p(x) = x^3 + 2x^2 - x + 2,\ g(x) = x^2 - 1,\ q(x) = x + 2,\ r(x) = 4.$

S4. $p(x) = x^3 + x^2 + x + 1,\ g(x) = x^2 - 1,\ q(x) = x + 1,\ r(x) = 2x + 2.$

S5. $x^2 + 3x + 2.$

S6. The zeroes of $x^2 - 3$ are $+\sqrt{3}$ and $-\sqrt{3}$.
Sum of zeroes = 0.
Product of zeroes = – 3.

S7. Quotient = $3x - 5$.
Remainder = $9x + 10$.

S8. Verified.

S9. The zeroes of $x^2 + 7x + 10$ are – 2 and – 5.
Sum of zeroes = – 7.
Product of zeroes = 10.

S10. Quotient = $x - 2$.
Remainder = 3.
Verification of the division algorithm

$$\begin{aligned}\text{Divisor} \times \text{Quotient} + \text{Remainder} &= (-x^2 + x - 1)(x - 2) + 3\\ &= -x^3 + x^2 - x + 2x^2 - 2x + 2 + 3\\ &= -x^3 + 3x^2 - 3x + 5\\ &= \text{Divident.}\end{aligned}$$

S11. (i) 1 (ii) 2

S12. (i) 3 (ii) 1

S13. (i) 3 (ii) 2

S14. (i) No zeroes (ii) 1

S15. (i) 1 (ii) 4

S16. Quotient = $-x^2 - 2$ and reminder = $-5x + 10$.

S17. No.

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S18. Yes.

S19. Quotient = $x - 3$ and reminder = $7x - 9$.

S20. Quotient = $x^2 + x - 3$ and reminder = 8.

S21. (i) $4x^2 - x - 4$ (ii) $x^2 - x + 1$

S22. (i) $4x^2 + x + 1$ (ii) $x^2 - 4x + 1$

S23. (i) 4 (ii) 3

S24. $g(x) = x^2 - x + 1$.

S25. (i) $-2,\ 4$ (ii) $-2,\ 0$

S26. $a = 1,\ b = +\sqrt{2}$.

S27. $x^3 - 2x^2 - 7x + 14$.

S28. Yes.

S29. (i) $3x^2 - 3\sqrt{2}x + 1$ (ii) $x^2 + \sqrt{5}$

S30. (i) $-\frac{1}{3}, \frac{3}{2}$ (ii) $-1, \frac{4}{3}$

S31. (i) $\frac{1}{2}, \frac{1}{2}$ (ii) $-\sqrt{15}, \sqrt{15}$

S32. Try yourself.

S33. Try yourself.

S34. $-5,\ 7$.

S35. $-1,\ -1$.

S36. Zeros of the polynomial are: $\sqrt{2}, -\sqrt{2}, \frac{1}{2}$ and 1.

S37. $k = 5$ and $a = -5$.

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