Q1) Which one of the following statements is TRUE?

a) $\dfrac{x}{x-2} = \dfrac{2}{x-2}$ and $2x - 3 = 1$ are equivalent equations.

b) 5 is the solution of the equation $\dfrac{x}{x-5} = 1 - \dfrac{5}{x-5}$.

c) The equation $x^2 = x$ has one real solution.

d) The equation $3|x-1| + 12 = 9$ has no real solutions.

e) If $\sqrt{a} + \sqrt{b} = c$, then $a + b = c^2$.

Q2) The rational expression $\dfrac{x^2 + x - 2}{x^2 y - z + x^2 z - y}$ simplifies to

a) $\dfrac{x+2}{(y+z)(x+1)}$

b) $\dfrac{x-2}{(y+z)(x+1)}$

c) $\dfrac{x-1}{(y+z)(x+1)}$

d) $\dfrac{x+2}{(y-z)(x+1)}$

e) $\dfrac{x+2}{(y+z)(x-1)}$

Q3) The solution set, in interval notation, of the inequality $\dfrac{x^2-x-2}{x-1}<0$ is equal to

a) $(-\infty,-1)\cup(1,2)$

b) $(-1,1)\cup(2,\infty)$

c) $(-\infty,-1)\cup(2,\infty)$

d) $(-\infty,1)$

e) $(-1,1)\cup(1,2)$

Q4) The NUMBER of REAL solutions of the equation $3-\sqrt{x}=\sqrt{2\sqrt{x}-3}$ is equal to

a) 3

b) 0

c) 2

d) 1

e) 4

Q5) $\dfrac{x^2}{x^2-x}-\dfrac{3x^2+x-2}{3x^2-5x+2}\div\dfrac{2x^2+x-1}{2x^2-3x+1}$ simplifies to

a) $\dfrac{x}{x-1}$

b) 1

c) $\dfrac{1}{x-1}$

d) $\dfrac{-1}{x-1}$

e) $2x-1$

Q6) If x_1 and x_2 are solutions of the equation $4x^{\frac{2}{3}} - 4x^{\frac{1}{3}} = 3$ and $x_1 < x_2$, then $27x_1 + x_2$ is equal to

   a) 3

   b) 27

   c) 0

   d) 1

   e) − 27

Q7) The solution set of the equation $\sqrt{x+1} + \sqrt{2x-5} = 1$ contains

   a) One positive integer.

   b) Two positive integers.

   c) One negative integer.

   d) One positive and one negative integers.

   e) No real solutions.

Q8) Which one of the following statements is FALSE?

   a) Prime numbers are not closed under addition.

   b) If $x < 0$, then $|-x| = -x$.

   c) If $(a-b) = 4$, then $4 = (a-b)$.

   d) Irrational numbers are not closed under addition.

   e) $|x+y| = |x| + |y|$.

Q9) If $i = \sqrt{-1}$, then the expression $\left(i^{219} + i^{-23}\right)$ simplified to

    a) 0

    b) i

    c) $-i$

    d) 1

    e) -1

Q10) If the expression, $\left|\dfrac{x-5}{|2x-8|+\left|\frac{1}{2}x-2\right|}\right|, 4 < x < 5$, is written without using absolute value symbols then it is the same as

    a) $\dfrac{10-2x}{5x-20}$

    b) $\dfrac{10-2x}{20-5x}$

    c) $\dfrac{10-2x}{3x-12}$

    d) $\dfrac{2x-10}{3x-6}$

    e) $\dfrac{10-2x}{5x-12}$

Q11) The solution set, in interval notation, of $x < \dfrac{1}{x}$ is equal to

    a) $(-1,1)$

    b) $(-\infty,\ -1)\ \cup\ (0,\ 1)$

    c) $(-1,\ 0)\cup\ (1,\ \infty)$

    d) $(-1,\ 0]\cup\ (1,\ \infty)$

    e) $(-\infty,\ -1)\cup\ (1,\ \infty)$

Q12)   The **SUM OF THE SOLUTIONS** of the equation $|x-1|^2 + 6 = 5|x-1|$ is equal to

     $a)\ 9$

     $b)\ 3$

     $c)\ -2$

     $d)\ 0$

     $e)\ 4$

Q13)   The solution set, in interval notation, of the inequality $\dfrac{x+1}{x-1} - x \le 1$ is equal to

     $a)\ [2,\ \infty)$

     $b)\ [-1,\infty)$

     $c)\ [-1,1)\cup[2,\ \infty)$

     $d)\ [-1,1)\cup(1,2]$

     $e)\ (-\infty,-1]\cup(1,2]$

Q14)   One factor of $x^2 - 2xy + y^2 - x^3 + y^3$ is

     $a)\ (x-y)$

     $b)\ (x+y)$

     $c)\ (x-2y)$

     $d)\ (2x-y)$

     $e)\ (x+2y)$

Q15) If $\dfrac{by+2}{y+3c}=\dfrac{2}{3}$, then $y =$

a) $\dfrac{6c+6}{3b-2}$

b) $\dfrac{6c-6}{3b+2}$

c) $\dfrac{3b-2}{6c-6}$

d) $\dfrac{6c-6}{3b-2}$

e) $\dfrac{c-1}{b-1}$

Q16) If $x^2 - kx + 1 = -x$ has two real distinct solutions, find the values of k