Quadratic Equations and Inequations(Inequalities)

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Section D.MCQs with One or More than One Correct

13) Number of integral divisors of the form $4n+2(n \geq 0)$ of the integer 240 is (1984-2Marks)

a) a positive integer
b) divisible by n
c) equal to n+$\frac{1}{n}$
d) never equal to n

14) If $3^X = 4^x - 1$,then $x =$ (JEE Adv. 2013)

a) $\frac{2\log_3 2}{2\log_3 2-1}$
b) $\frac{2}{2-\log_2 3}$
c) $\frac{1}{1-\log_4 3}$
d) $\frac{2\log_2 3}{2\log_2 3-1}$

15) Let S be the set of all non-zero real numbers α such that quadratic equation $\alpha x^2 - x + \alpha = 0$ has two distinct real roots x_1 and x_2 satisfying the inequality$|x_1 - x_2| < 1$. Which of the following intervals is(are) α subset of S? (JEE Adv. 2015)

a) $\left(-\frac{1}{2}, -\frac{1}{\sqrt{5}}\right)$
b) $\left(-\frac{1}{\sqrt{5}}, 0\right)$
c) $\left(0, \frac{1}{\sqrt{5}}\right)$
d) $\left(\frac{1}{\sqrt{5}}, \frac{1}{2}\right)$

Section E.Subjective Problems

1) solve for $x : 4^x - 3^{x-\frac{1}{2}} = 3^{x+\frac{1}{2}} - 2^{2x-1}$ (1978)
2) If (m,n)=$\frac{(1-x^m)(1-x^{m-1})\ldots\ldots(1-x^{m-n+1})}{(1-x)(1-x^2)\ldots\ldots(1-x^n)}$
Where m and n are positive integers $(n \leq m)$.show that $(m, n+1) = (m-1, n+1) + x^{m-n+1}(m-1, n)$ (1978)
3) Solve for x: $\sqrt{x+1} - \sqrt{x-1} = 1$. (1978)
4) Solve the following equation for x:
$2\log_x a + \log_{ax} a + 3\log_{a^2 x} a = 0, a > 0$ (1978)
5) Show that the square of $\frac{\sqrt{26-15\sqrt{3}}}{5\sqrt{2}-\sqrt{38+5\sqrt{3}}}$ is a rational number. (1978)
6) Sketch the solution set of the following system of inequalities:
$x^2 + y^2 - 2x \geq 0; 3x - y - 12 \leq 0; y - x \leq 0; y \geq 0.$ (1978)
7) Find all integers x for which
$(5x-1) < (x+1)^2 < (7x-3)$. (1978)
8) If α, β are the roots of $x^2 + px + q = 0$ and γ, δ are the roots of $x^2 + rx + s = 0$,evaluate $(\alpha-\gamma)(\alpha-\delta)(\beta-\gamma)(\beta-\delta)$ in terms of p,q,r,and s.
Deduce the condition that the equations have a common root. (1979)
9) Given $n^4 < 10^n$ for a fixed positive integer $n \geq 2$,
prove that $(n+1)^4 < 10^{n+1}$. (1980)
10) Let $y = \sqrt{\frac{(x+1)(x-3)}{(x-2)}}$
Find all the real values of x for which y takes real values. (1980)
11) For what values of m,does the system of equations (1980)
$3x + my = m$
$2x - 5y = 20$
has solution satisfying the condition $x > 0, y > 0$. (1980)
12) find the solution set of the system
$x + 2y + z = 1;$
$2x - 3y - w = 2;$
$x \geq 0; y \geq 0; z \geq 0; w \geq 0.$ (1980)