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NUMBER SYSTEM

ASSIGNMENT NO. 6

1. If $x = \sqrt{3} + 2\sqrt{2}$ and $x = \sqrt{3} - 2\sqrt{2}$, then evaluate $x^4 + y^4 + 6x^2y^2$
2. For the identity $\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + 7\sqrt{5}b$, determine the values of rational numbers a and b.
3. If $x = 1 - \sqrt{2}$, then find the value of $x^2 + \frac{1}{x^2}$
4. Simplify: (a) $(49)^{-\frac{3}{2}}$ (b) $(0.0001)^{\frac{-3}{4}}$
5. If $a^x = b$, $b^y = c$ and $c^z = a$, then prove that $xyz = 1$, here a, b, c are positive real numbers and x, y, z are rational numbers.
6. Simplify: $\left(\frac{81}{16}\right)^{-\frac{3}{4}} \times \left(\frac{25}{9}\right)^{-\frac{3}{2}} \times \left(\frac{2}{5}\right)^{-3}$
7. Prove that $\frac{1}{1+x^{a-b}} + \frac{1}{1+x^{b-a}} = 1$
8. If $5^{2x-1} - 25x^{-1} = 2500$, then find the value of x.
9. If $\sqrt{13 - a\sqrt{10}} = \sqrt{8} + \sqrt{5}$, then find the value of a.
10. If $\sqrt{2^n} = 1024$, then find the value of $3^{2\left(\frac{n}{4} - 4\right)}$
11. If $27^x = \frac{9}{3^x}$, then find the value of x.
12. Find the value of x in $\sqrt[4]{3x + 1} = 2$
13. If $2^m \times \frac{1}{2^m} = \frac{1}{4}$, then find the value of $\frac{1}{14}\left[(4^m)^{\frac{1}{2}} + \left(\frac{1}{5^m}\right)^{-1}\right]$
14. If a, m, n are positive integers, then find the value of $\left(\sqrt[m]{\sqrt[n]{a}}\right)^{mn}$