INTERMEDIATE ALGEBRA — concluded

8 a Form the quadratic equation whose roots are \( \frac{4}{3} \) and \(-3\). \([6]\]

b Without solving the equation, determine the nature of the roots of \(8x^2 - 12x = 9\). \([6\frac{1}{2}]\)

9 A dealer bought a horse, expecting to sell it at a profit of 10%; he was forced to sell it for \$50 less than he expected and found in doing that he had lost 15\% on the cost. What did he pay for the horse? \([12\frac{1}{2}]\)

10 If the rate of a train is increased 5 miles per hour, the train travels 210 miles in one hour less than the usual time required for the trip; find the usual time. \([12\frac{1}{2}]\)

11 a Represent graphically the equation \(x^2 + 2x - 6 = y\) from \(x = -5\) to \(x = +3\). \([8]\)

b From the graph determine to the nearest tenth the roots of the equation \(x^2 + 2x - 6 = 0\). \([2\frac{1}{2}]\)

c From the graph determine the nature of the roots of the equation \(x^2 + 2x - 6 = -7\). \([2]\)

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Answer eight questions. Full credit will not be granted unless all operations (except mental ones) necessary to find results are given; simply indicating the operations is not sufficient. Each answer should be reduced to its simplest form. Papers entitled to less than 75 credits will not be accepted.

1 Find the prime factors of each of the following:
- \(6x^2 + x - 12\) \([2\frac{1}{2}]\)
- \(y^4 - 128x^4\) \([2\frac{1}{2}]\)
- \(x^2 - .17x - .006\) \([2\frac{1}{2}]\)
- \(x^{6a} - y^{6b}\) \([2\frac{1}{2}]\)
- \(x^2 - 4x^2 + x + 6\) \([2\frac{1}{2}]\)

2 By what expression must \(\frac{1}{x^2} - 2\) be multiplied to obtain \(2x - 3x^{-1} + 3x^{-2} + x^{-3} - 6\)? Express your answer with positive exponents in ascending powers of \(x\). \([8, 2, 2\frac{1}{2}]\)

3 a Simplify \(\left(\frac{a^{-3}}{b^{-3}c}\right)^{-1} + \left(\frac{\sqrt[3]{a^{-1}} \times \sqrt[4]{b^2}}{a^4c^{-1}}\right)^{-3}\). \([6]\)

b Find to the nearest hundredth the value of \(\frac{87}{7 - 2\sqrt{5}}\) first rationalizing the denominator. \([6\frac{1}{2}]\)

4 Find to the nearest tenth the negative root of the equation \(\frac{1}{2}x^2 + .8x - .24 = 0\). What is the error that would result from using this value as a root? \([12\frac{1}{2}]\)

5 Solve the following set of equations and group your answers:
- \(3x^2 + xy + y^2 = 15\)
- \(31xy - 3x^2 - 5y^2 = 45\) \([10, 2\frac{1}{2}]\)

6 Solve the following equation and check your answer:
\[\sqrt{x} - \sqrt{x-8} = \frac{2}{\sqrt{x-8}}\] \([12\frac{1}{2}]\)

7 By the use of logarithms find the value of \(\frac{.36 \times \sqrt[3]{89.7}}{60.77}\) \([12\frac{1}{2}]\)