

Name \_\_\_\_\_

Advanced Algebra

Date \_\_\_\_\_

Module 4.1-4.2 Review

Solve the following by FACTORING:

1)  $(x^3 + 3x^2) - (25x - 75) = 0$

$x^2(x+3) - 25(x+3) = 0$   
 $(x^2 - 25)(x+3) = 0$   
 $(x+5)(x-5)(x+3) = 0$

$x = \pm 5, -3$

3)  $x^2 + 14x + 45 = 0$

$(x+9)(x+5) = 0$

$x = -9, -5$

~~$\frac{45}{9 \cdot 5}$~~   
 ~~$\frac{14}{14}$~~

2)  $3x^3 - 16x^2 + 12x = 0$

$x(3x^2 - 16x + 12) = 0$   
 $(3x^2 - 18x) + (2x - 12)$   
 $3x(x-6) + 2(x-6)$   
 $x(3x+2)(x-6) = 0$

~~$\frac{-36}{-18 \cdot 2}$~~   
 ~~$\frac{-16}{-16}$~~

$x = 0, -2/3, 6$

4)  $9x^3 - 4x = 0$

$x(9x^2 - 4) = 0$

$x(3x+2)(3x-2) = 0$

$x = 0, -2/3, 2/3$

5)  ~~$2x^5 + 6x^3 = 56x$~~

6)  $5x^2 = 17x - 12$

$5x^2 - 17x + 12 = 0$   
 $(5x^2 - 12x)(-5x + 12)$   
 $x(5x-12) - 1(5x-12)$   
 $(x-1)(5x-12) = 0$

~~$\frac{60}{-12 \cdot -5}$~~   
 ~~$\frac{-17}{-17}$~~

$x = 1, 12/5$

Determine the Possible Rational Roots using the Rational Root Theorem:

7)  $3x^4 - 2x^2 + 11 = 0$

$\frac{p}{q} = \frac{\pm \{1, 11\}}{\pm \{1, 3\}} = \pm \{1, 1/3, 11, 11/3\}$

8)  $x^3 - 3x^2 + 8x - 24 = 0$

$\frac{p}{q} = \frac{\pm \{1, 24, 2, 12, 3, 8, 4, 6\}}{\pm 1}$

$\pm \{1, 24, 2, 12, 3, 8, 4, 6\}$

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Module 4.1-4.2 Review

Solve the following using SYNTHETIC DIVISION & FACTORING:

9)  $3x^3 + 4x^2 - 5x - 2 = 0$

$X = \underline{1}, \underline{-\frac{1}{3}}, \underline{-2}$

$$\begin{array}{r|rrrr} 1 & 3 & 4 & -5 & -2 \\ & \downarrow & & & \\ & 3 & 7 & 2 & \underline{0} \end{array}$$

~~$\frac{6}{7} \times 1$~~

$$3x^2 + 7x + 2 = 0$$

$$(3x^2 + 6x) + (x + 2)$$

$$3x(x+2) + 1(x+2)$$

$$(3x+1)(x+2) = 0$$

$X = -\frac{1}{3}, -2$

10)  $x^4 - x^3 - 3x^2 + x + 2 = 0$

$X = \underline{-1}, \underline{-1}, \underline{1}, \underline{2}$

$$\begin{array}{r|rrrrr} -1 & 1 & -1 & -3 & 1 & 2 \\ & \downarrow & & & & \\ & 1 & -2 & -1 & 2 & \underline{0} \end{array}$$

$$(x^3 - 2x^2)(x+2) = 0$$

$$x^2(x-2) - 1(x-2) = 0$$

$$(x^2-1)(x-2) = 0$$

$$(x+1)(x-1)(x-2) = 0$$

$X = -1, 1, 2$

Solve the following using SYNTHETIC DIVISION & QUADRATIC FORMULA:

11)  $2x^3 + 5x^2 + 2x - 1 = 0$

$X = \underline{-1}, \underline{\frac{-3+\sqrt{17}}{4}}, \underline{\frac{-3-\sqrt{17}}{4}}$

$$\begin{array}{r|rrrr} -1 & 2 & 5 & 2 & -1 \\ & \downarrow & & & \\ & 2 & 3 & -1 & \underline{0} \end{array}$$

$$2x^2 + 3x - 1 = 0$$

$$X = \frac{-3 \pm \sqrt{9 - 4(2)(-1)}}{2(2)}$$

$$= \frac{-3 \pm \sqrt{17}}{4}$$

12)  $x^3 - 9x^2 + 33x - 25 = 0$

$X = \underline{1}, \underline{4+3i}, \underline{4-3i}$

$$\begin{array}{r|rrrr} 1 & 1 & -9 & 33 & -25 \\ & \downarrow & & & \\ & 1 & -8 & 25 & \underline{0} \end{array}$$

$$x^2 - 8x + 25 = 0$$

$$X = \frac{8 \pm \sqrt{(64 - 4(1)(25))}}{2(1)}$$

$$= \frac{8 \pm \sqrt{-36}}{2} = \frac{8 \pm 6i}{2}$$

$= 4 \pm 3i$