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j. $8x^2 + 6x - 2$

$= 2(4x^2 + 3x - 1)$

$2(4x^2 + 4x - x - 1)$

$2(4x(x+1) - 1(x+1) = 2(4x-1)(x+2)$.

$\therefore 2(4x-1)(x+1) = 8x^2 + 6x - 2$.

k. $9x^2 + 9x - 4$

$9x^2 + 9x - 4 = 9x^2 + 12x - 3x - 4$

$\therefore 3x(3x+4) - 1(3x+4) = (3x-1)(3x+4)$

$\therefore 9x^2 + 9x - 4 = (3x-1)(3x+4)$

l. $3x^2 - 4x - 20$

Rewrite $3x^2 - 4x - 20 = 3x^2 + 6x - 10x - 20$

$\therefore 3x(x+2) - 10(x+2) = (3x-10)(x+2)$.

$\therefore (3x+10)(x+2) = 3x^2 - 4x - 20$

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f. $3x^2 - 3x + 2x - 2$

Simply check like terms.

$3xc^2 - x - 2$.

$\therefore 3x^2 - 3x + 2x - 2 = 3x^2 - x - 2$

g. $2x^2 + 3x + 1$

$\Rightarrow 2xc^2 + 2x + x + 1 \Rightarrow 2x(x+1) + x + 1$

$\therefore 2x(x+1) + x + 1 = (2x+1)(x+1)$

$\therefore 2x^2 + 3x + 1 = (2x+1)(x+1)$.

h. $3x^2 - 14x + 8$

$3x^2 - 14x + 8 = 3x^2 - 2x - 12x + 8$

$\Rightarrow x(3x-2) - 4(3x-2)$

$3x^2 - 2x - 12x + 8 = (x-4)(3x-2)$.

Solution $(x-4)(3x-2)$

i. $3 - 27x^2$

$x - 27x^2 = 3(1-3x)(x-3x)$

factor out common terms

$3(1-9x^2)$; $\therefore 1 - 9x^2 = (1+3x)(1-3x)$

$\therefore (1+3x)(1-3x) = 3(1+3x)(1-3x)$

Name: Mark Mwukoro	Date:

Course: MAT110	Nyack College

c. $x^2 - 25$

$(x-5)(x+5)$

$x(x-5) + 5(x-5)$

$x^2 - 5x + 5x - 25$

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

d. $x^2 + 10x + 25$

$\Rightarrow x^2 + 5x + 5x + 25$

$\therefore (x+5)(x+5)$

$x(x+5)\,5(x+5) \Rightarrow (x+5)(x+5)$

$\therefore x^2 + 10x + 25 = (x+5)^2$

e. $x^2 + 2x - 8$

$= (x-2)(x+4) \Rightarrow x(x+4) - 2(x+4)$

$\Rightarrow x^2 + 4x - 2x - 8$

$= x^2 + 2x - 8$

$\therefore x^2 + 2x - 8 = (x-2)(x+4)$

Name: Mark Mworeko Date:

Course: MAT 110 Nyack College

3. Factor each the following polynomials completely:

a. $7x - 14$

$F(x) = 7x - 14.$

$\therefore 7x - 14 \Rightarrow 7(x - 2).$

$\Rightarrow 7(x - 2) = 7x - 14$

b. $x^2 - 4$

$\Rightarrow x^2 + 2x - 2x - 4$

$x(x+2) - 2(x+2)$

That is $\Rightarrow (x-2)(x+2)$

$\therefore x(x+2) - 2(x+2) = x^2 - 4$

ANS $(x-2)(x+2)$

Name: MARIE NWOKOZO Date:

Course: MATH 110 Nyack College

2. Find the quotient of the following polynomials:

a. *Dividend*: $3x^3 - x^2 + x - 2$
Divisor: x^2

$\Rightarrow$ Simplify $\frac{2}{x^2}$ to have $\left((3x^3 - x^2) + x\right) - \frac{2}{x^2}$.

$3x^2 - x^2 + x = \frac{3x^3 - x^2 + x}{1} = \frac{(3x^3 - x^2 + x) \cdot x^2}{x^2}$

$3x^3 - x^2 + x = x \cdot (3x^2 - x + 1)$ factorise $3x^2 - x + 1$

Coefficient of $3x^2 = 3$, Coefficient of $-x = -1$, Constant $= 1$.

multiply Coefficient by Constant $3 \cdot 1 = 3$.

$\therefore \frac{x \cdot (3x^2 - x + 1) \cdot x^2}{x^2} - 2 = \frac{3x^5 - x^4 + x^3 - 2}{x^2}$ $\Rightarrow$ Factoring $3x^5 - x^4 + x^3 - 2$

Find roots of $F(x) = 3x^5 - x^4 + x^3 - 2$. split expression into groups

(1) $x^3 - 2 = (x^3 - 2) \cdot 1$

(2) $3x^5 - x^4 \Rightarrow (3x - 1) \cdot (x^4)$ fitting into this $\Rightarrow \frac{3x^5 + x^4 + x^3 + 2}{x^2}$

$\Rightarrow$ Ans $= 3x^5 + x^4 + x^3 + 2/x^2$

b. *Dividend*: $x^5 - a^5$ $\Longrightarrow$ Simplify $\frac{(a^5)}{x} \Rightarrow x^5 - \frac{a^5}{x} - a$
Divisor: $x - a$

$x^5 = \frac{x^5}{1} = \frac{x^5 \cdot x}{x}$ Add two equivalent fractions $= \frac{x^5 \cdot x - (a)^5}{x} = \frac{x^6 - a^5}{x}$

$\therefore \frac{x^6 - a^5}{x} - a$ Also $\left(a = \frac{a}{1} = \frac{a \cdot x}{x}\right)$ · factoring $x^6 - a^5 = (a - b) \times (a^2 + ab + b^2)$

Adding the two equivalent fractions.

$\frac{(x^6 - a^5) - (a \cdot x)}{x} = \frac{x^6 - xa - a^5}{x}$

when factoring $x^6 - xa - a^5$ to arrive at

$\frac{x^6 + xa + a^5}{x} = \frac{x^5 - a^5}{x - a}$ Ans

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Course: MAT 110 Nyack College

d. $(3x-2)^3$ ⇒ Expand

$(3x-2)(3x-2)(3x-2) \Rightarrow (3x-2)(3x-2)$

$3x(3x-2)-2(3x-2) \Rightarrow 9x^2-6x-6x+4$

$\therefore (3x-2)(9x^2-12x+4) \Rightarrow 3x(9x^2-12x+4)-2(9x^2-12x+4)$

$\Rightarrow 27x^3-36x^2+12x-18x^2+24x-8 \Rightarrow 36x^3-54x^2+36x-8$

Raise -2 to power 3 $\Rightarrow (3x-2)^3 = 27x^3-54x^2+36x-8$ ans.

e. $(x-2)^3$ Expand.

$(x-2)(x-2)(x-2) \Rightarrow x(x-2)-2(x-2) \Rightarrow x^2-2x-2x+4$

$\Rightarrow (x^2-4x+4)(x-2) \Rightarrow x(x^2-4x+4)-2(x^2-4x+4)$

$x^3-4x^2+4x-2x^2+8x-8 \Rightarrow x^3-6x^2-12x-8$

raise -2 to the power of 3 ∴

$x^3-6x^2+12x+(-2)^3 \Rightarrow (x-2)^3$.

f. $(2x+1)^3$ Expand.

$(2x+1)(2x+1)(2x+1) \Rightarrow$

$(2x+1)(2x+1) \Rightarrow 2x(2x+1)+1(2x+1)$

$4x^2+2x+2x+1 \Rightarrow (2x+1)(4x^2+4x+1)$

$2x(4x^2+4x+1)+1(4x^2+4x+1)$

$\Rightarrow 8x^3+8x^2+2x+4x^2+4x+1$ then Collect like terms

$\Rightarrow 8x^3+12x^2+6x+1$

$\therefore (2x+1)^3 = 8x^3+12x^2+6x+1$

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Course: MAT 110 Nyack College

College Algebra

Preliminary Assessment #4

Directions: Provide complete responses to each question. Make sure to show your work.

1. Find the product of the following polynomials using the appropriate special formula:

   a. $(2x-1)(2x+1)$ =>

Distribute them => $2x(2x+1)-1(2x+1)$

=> $4x^2+2x-2x-1$,

Collect like terms => $4x^2-1$

Ans = $4x^2-1$

   b. $(3x-2)(3x+2)$

distribute => $3x(3x+2)-2(3x+2)$

=> $9x^2+6x-6x-4$ => collect like terms

=> $9x^2-4$

   c. $(x-5)^2$

Expand to come up with

$(x-5)(x-5)$ => $x(x-5)-5(x-5)$

=> $x^2-5x-5x+25$

=> $x^2-10x+25$