

SEMESTER REVIEW

Factoring.

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

$$x^2 + 25 = \text{not factorable}$$

$$x^3 - 27 = (x-3)(x^2+3x+9)$$

$$x^3 + 64 = (x+4)(x^2-4x+16)$$

$$x^2 - 3x - 28 = (x+4)(x-7)$$

$$\begin{aligned} &(x^3 - 6x^2)(-5x + 30) \\ &x^2(x-6) - 5(x-6) \\ &(x-6)(x^2-5) \end{aligned}$$

$$\begin{aligned} a^2 - b^2 &= (a+b)(a-b) \\ a^3 - b^3 &= (a-b)(a^2 + ab + b^2) \\ a^3 + b^3 &= (a+b)(a^2 - ab + b^2) \end{aligned}$$

3 terms
UnFOIL

4 term
Grouping -
2 steps

Synthetic Division

$$\begin{array}{r} 2x^3 + 4x^2 - x + 6 \\ x + 2 \end{array}$$

-2
change sign

$$\begin{array}{r} -2 \mid 2 \quad 4 \quad -1 \quad 6 \\ + \quad 0 \quad -4 \quad 0 \quad 2 \\ \hline 2 \quad 0 \quad -1 \quad 8 \end{array}$$

$$\boxed{2x^2 + 0x - 1 + \frac{8}{x+2}} \quad 7 \overline{) 45} \begin{array}{r} 6 \\ -42 \\ \hline 3 \end{array}$$

$$\frac{(2^3 x^9 y^{-12}) (2^{-2} x^2 y^{-2})}{2^5 x^{-2} y^{-5}} =$$

$$\frac{(2^3 x^9 y^{-12}) (2^{-2} x^2 y^{-2})}{2^5 x^{-2} y^{-5}}$$

$$\frac{2^1 x^{11+2-14} y^{-14}}{2^{5-1} x^{-2} y^{-5+14}} = \frac{x^{13}}{2^4 y^9}$$

$$= \frac{x^{13}}{16y^9}$$

$$\frac{1}{2} + \frac{1}{6}$$

$$7^4 \cdot 7^{-6} = 7^{-2} = \frac{1}{7^2} = \frac{1}{49}$$

Do root first.

$$9^{5/2} = \sqrt[2]{9^5} = 3^5 = \boxed{243}$$

$$(x^a)^b = x^{a \cdot b}$$

$$x^a \cdot x^b = x^{a+b}$$

$$\sqrt[2]{63 x^7 y^{20} z^{14}}$$

← even

$$3 x^3 y^{10} z^7 \sqrt{7 x^1}$$

← odd

Even-Even-Odd
 Root Power Power
 Inside Outside

Like II. When to add abs. value

$$\sqrt[2]{f^4 g^2} \cdot \sqrt[2]{f^3 g^4}$$

← even ← even

$$= \sqrt[6]{f^{12} g^6} \cdot \sqrt[6]{f^3 g^4}$$

$$= \sqrt[6]{f^{15} g^{10}}$$

← odd

$$f^2 g \sqrt[6]{f^3 g^4}$$

Solving Roots

$$4\sqrt{x+3} - 7 = 1$$

$$+7 \quad +7$$

$$4\sqrt{x+3} = 8$$

$$\frac{4}{4} \quad \frac{8}{4}$$

$$(\sqrt{x+3})^2 = (2)^2$$

$$x+3 = 4$$

$$x = 1$$

Check answer.

$$4\sqrt{1+3} - 7 = 1$$

$$4\sqrt{4}$$

$$8 - 7 = 1$$

$$\checkmark 1 = 1$$

- 1) Isolate root
- 2) Square both sides

- 1) Isolate a root
- 2) Sq. both sides

$$(\sqrt{x-5} + 2)^2 = (\sqrt{x+7})^2$$

Check: $\sqrt{4} + 2 = 2 + 2 = 4 = \sqrt{16}$

$$(\sqrt{x-5} + 2)(\sqrt{x-5} + 2) = x+7$$

FOIL!

$$x-5 + 2\sqrt{x-5} + 2\sqrt{x-5} + 4 = x+7$$

clean up

$$\cancel{x} - 1 + 4\sqrt{x-5} = \cancel{x} + 7$$

$$-x + 1 \quad -x + 1$$

Isolate root

$$4\sqrt{x-5} = 8$$

$$\frac{4}{4} \quad \frac{8}{4}$$

$$(\sqrt{x-5})^2 = (2)^2$$

$$x-5 = 4$$

$$x = 9$$

$$19/ \quad f(x) = \frac{x+2}{x-5}$$

$$g(x) = 3x+1$$

$$f[g(-1)]$$

$$g(-1) = 3(-1) + 1$$

$$= -2$$

$$f(-2) = \frac{-2+2}{-2-5} = \frac{0}{-7} = \boxed{0}$$

$$(f \circ g)(x) = \frac{3x+1+2}{3x+1-5}$$

$$= \frac{3x+3}{3x-4}$$