Period 4, 9/3/24

Domain

$$\frac{\sqrt{x}+\frac{5}{\sqrt{x}}}{x}$$

$x \neq 0$

$$\frac{\frac{\sqrt{x}}{1}+\frac{5\sqrt{x}}{\sqrt{x}\cdot\sqrt{x}}}{x} = \frac{\frac{x\cdot\sqrt{x}}{x\cdot 1}+\frac{5\sqrt{x}}{x}}{x} = \frac{\frac{x\sqrt{x}}{x}+\frac{5\sqrt{x}}{x}}{x}$$

$$\frac{\frac{x\sqrt{x}+5\sqrt{x}}{x}}{\frac{x}{1}} = \frac{x\sqrt{x}+5\sqrt{x}}{x}\cdot\frac{1}{x} = \frac{x\sqrt{x}+5\sqrt{x}}{x^2}$$

$$\frac{\sqrt{x}(x+5)}{x^2} = \frac{(x+5)}{x^{3/2}}$$

$$x^{\frac{1}{2}-2} = x^{-\frac{3}{2}}$$

$$\frac{x-1}{x^2+6x+5} = \frac{(x-1)}{(x+1)(x+5)}$$

$x \neq -1, -5$

$1x^2+6x+5$

$1\cdot 5 = 5$

$1+5=6$

$x^2+x+5x+5$

$x(x+1)+5(x+1)$

$(x+1)(x+5)$

$$\frac{y^3+729}{y^2-81}\cdot\frac{y-9}{5y} =$$

$729 = a^3$

$\sqrt[3]{729} = 9 = a$

$a^3+b^3 = (a+b)(a^2-ab+b^2)$

$a^2-b^2 = (a-b)(a+b)$

$$\frac{y^3+9^3}{y^2-9^2}\cdot\frac{y-9}{5y}$$

$$\frac{(y+9)(y^2-y\cdot 9+9^2)}{(y+9)(y-9)}\cdot\frac{(y-9)}{5y}$$

$y \neq -9, 9, 0$

$$\frac{\cancel{(y+9)}(y^2-9y+81)\cancel{(y-9)}}{5y\cancel{(y+9)}\cancel{(y-9)}} = \frac{y^2-9y+81}{5y}$$

$$\frac{x^2+x}{x^2-49} \div \frac{x^2-1}{x^2+17x+70} = \frac{x(x+1)}{(x-7)(x+7)} \div \frac{(x-1)(x+1)}{(x+7)(x+10)}$$

$x \neq 7, -7, -10$

$x \neq 1, -1$

$$\frac{x(x+1)}{(x-7)(x+7)} \cdot \frac{(x+7)(x+10)}{(x-1)(x+1)}$$

$$\frac{x\cancel{(x+1)}\cancel{(x+7)}(x+10)}{(x-7)\cancel{(x+7)}(x-1)\cancel{(x+1)}} = \frac{x(x+10)}{(x-7)(x-1)}$$

$$\frac{2x^2+3x-3}{x^2+6x+5} - \frac{x}{x+1} + \frac{2}{x+5}$$

$x \neq -1, -5$

$2x^2+3x-3$

$2 \cdot 3 = -6$

$2 + -3 = -1$

$-2 + 3 = 1$

$6 + -1 = 5$

$-6 + 1 = -5$

$$\frac{2x^2+3x-3}{(x+1)(x+5)} - \frac{x(x+5)}{(x+1)(x+5)} + \frac{2(x+1)}{(x+5)(x+1)}$$

$x^2+6x+5 = (x+5)(x+1)$

$1 \cdot 5 = 5$

$5+1 = 6$

$-5 + -1 = -6$

$$\frac{2x^2+3x-3}{(x+1)(x+5)} - \frac{x^2+5x}{(x+1)(x+5)} + \frac{2x+2}{(x+1)(x+5)}$$

$$\frac{2x^2+3x-3-x^2-5x+2x+2}{(x+1)(x+5)} = \frac{x^2+0x-1}{(x+1)(x+5)}$$

$$\frac{x^2-1^2}{(x+1)(x+5)} = \frac{(x-1)\cancel{(x+1)}}{\cancel{(x+1)}(x+5)}$$

$$\frac{(x-1)}{x+5}$$

asymptote $x=-5$

hole at $x=-1$

Simplify the complex rational expression.

$$\frac{\frac{6}{x-2}-\frac{7}{x+2}}{\frac{5}{x^2-4}} = \frac{\frac{6}{(x-2)}\frac{(x+2)}{(x+2)} - \frac{7}{(x+2)}\frac{(x-2)}{(x-2)}}{\frac{5}{(x-2)(x+2)}}$$

$x \neq 2, -2$

$$\frac{\frac{6x+12}{(x+2)(x-2)} - \frac{7x-14}{(x+2)(x-2)}}{\frac{5}{(x+2)(x-2)}} = \frac{\frac{6x+12-7x+14}{(x-2)(x+2)}}{\frac{5}{(x-2)(x+2)}} = \frac{-x+26}{\cancel{(x-2)(x+2)}} \cdot \frac{\cancel{(x-2)(x+2)}}{5}$$

$$\frac{-x+26}{5}$$

Rationalize the numerator.

$$\frac{(\sqrt{7x}+\sqrt{5y})}{(49x^2-25y^2)} \frac{(\sqrt{7x}-\sqrt{5y})}{(\sqrt{7x}-\sqrt{5y})}$$

$$\frac{\cancel{(7x-5y)}}{\cancel{(7x-5y)}(7x+5y)(\sqrt{7x}-\sqrt{5y})}$$

$$\frac{1}{(7x+5y)(\sqrt{7x}-\sqrt{5y})}$$

Perform the indicated operations. $x \neq -7, 3$

$$\left(\frac{8}{1}-\frac{80}{x+7}\right)\left(\frac{1}{1}+\frac{10}{x-3}\right)$$

$$\left(\frac{8(x+7)}{1(x+7)}-\frac{80}{x+7}\right)\left(\frac{1(x-3)}{1(x-3)}+\frac{10}{x-3}\right)$$

$$\frac{(8x-24)}{(x+7)} \cdot \frac{(x+7)}{x-3} = \frac{8\cancel{(x-3)}}{\cancel{(x+7)}} \cdot \frac{\cancel{(x+7)}}{\cancel{(x-3)}} = 8$$

Homework review

Factor and simplify the algebraic expression.

$$3x^{-5/2}+6x^{1/2} \qquad 3x^{-5/2}(1+2x^{\frac{6}{2}})$$

$$\frac{3\sqrt{x}}{\sqrt{x^5}\sqrt{x}} + 6\sqrt{x}$$

$$\frac{3}{\sqrt{x^5}} + 6\sqrt{x} =$$

$$\cancel{\frac{3}{x^{5/2}}}$$

$$\boxed{3x^{-\frac{5}{2}}(1+2x^3)}$$

$$\frac{3\sqrt{x}}{x^3} + 6\sqrt{x}$$

$$\sqrt{x}\left(\frac{3}{x^3}+6\right)$$

$$3\sqrt{x}\left(\frac{1}{x^3}+2\right) = \boxed{3\sqrt{x}(x^{-3}+2)}$$

Factor and simplify the algebraic expression.

$(x+5)^{1/5} - (x+5)^{6/5}$

$(x+5)^{\frac{1}{5}}\left(1-(x+5)^{\frac{5}{5}}\right) = (x+5)^{\frac{1}{5}}\left(1-(x+5)^{1}\right)$

$(x+5)^{\frac{1}{5}}(1-x-5)$

$(x+5)^{\frac{1}{5}}(-x-4)$

$-1(x+5)^{\frac{1}{5}}(x+4)$

$(x+5)^{1/5} - (x+5)^{6/5} = \boxed{-[x+5]^{\frac{1}{5}}[x+4]}$ (Typ

$x^3+y^3 = (x+y)(x^2-xy+y^2)$

Factor the following expression completely.

$p^{16}+p = P(P^{15}+1) = P[(P^5)^3+1^3] = P(P^5+1)((P^5)^2-P^5\cdot 1+1^2)$

$P(P^5+1)(P^{10}-P^5+1)$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- A. $p^{16}+p = \boxed{p[p^5+1][p^{10}-p^5+1]}$
- B. The polynomial is prime.

Factor the trinomial, or state that the trinomial is prime.

$3a^2 - 10ab - 32b^2$

$3\cdot -32 = -96$

$3 + -32 = -29$

$-3 + 32 = 29$

$-6 + 16 = 10$

$6 + -16 = -10$

$3a^2+6ab-16ab-32b^2$

$3a(a+2b)-16b(a+2b)$

$(a+2b)(3a-16b)$

Factor completely, or state that the polynomial is prime.

$x^2y - 9y + 54 - 6x^2$

$a^2 - b^2 = (a-b)(a+b)$

$y(x^2-9)+6(9-x^2)$

$y(x^2-9)-6(-9+x^2)$

$y(x^2-9)-6(x^2-9)$

$(x^2-9)(y-6)$

$(x^2-3^2)(y-6)$

$(x+3)(x-3)(y-6)$

Factor completely.

$14x^2(x+3) - 5x(x+3) - 6(x+3)$

$(x+3)(14x^2-5x-6)$

$14 \cdot -6 = -84$

$7 + -12 = -5$

$-7 \quad 12$

$(x+3)[14x^2+7x-12x-6]$

$7x(2x+1)-6(2x+1)$

$(x+3)(2x+1)(7x-6)$

Factor by grouping.

$x^3 - 6x^2 + 8x - 48$

$x^2(x-6)+8(x-6)$

$(x-6)(x^2+8)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Factor the following polynomial using the formula for the difference of two cubes.

$x^3 - 343$

$x^3 - 7^3 = (x-3)(x^2 + x\cdot 7 + 7^2)$

$(x-3)(x^2 + 7x + 49)$

Factor the polynomial completely, or state that the polynomial is prime.

$4x^4 - 4$

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

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

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

$x^6 - 2^6$

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

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

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

Factor the expression completely or state that the polynomial is prime.

$5x^2 - 5x - 210$

$5(1x^2 - x - 42)$

$1 \cdot -42 = -42$

$6 + -7 = -1$

$-6 + 7 = 1$

$5[x^2 + 6x - 7x - 42]$

$5[x(x+6) - 7(x+6)]$

$5(x+6)(x-7)$

Factor completely, or state that the polynomial is prime.

$\underbrace{x^2 - 16x} + \underbrace{64 - 16y^2}$

$x(x-16) - 16(4 - y^2)$

$\underbrace{x^2 - 16x + 64} - 16y^2$

$(x-8)^2 - 16y^2$ $\quad a^2 - b^2 = (a-b)(a+b)$

$((x-8) + 4y)(x-8-4y)$

$(x-8+4y)(x-8-4y)$