

Math 115

Fall 2018

Lecture 26

$$\begin{array}{c}
 ? a^2 + b^2 = c^2 ? \\
 y = mx + b \quad ? \quad d = rt
 \end{array}$$

Feb 19-8:47 AM

Simplify / Reduce:

$$\textcircled{1} \quad \frac{4y - 8}{10y - 20} = \frac{\cancel{4}^2(y - 2)}{\cancel{10}_5(y - 2)} = \boxed{\frac{2}{5}}$$

$$\textcircled{2} \quad \frac{6x^2 - 18x}{x^2 - 9} = \frac{6x\cancel{(x-3)}}{(x+3)\cancel{(x-3)}} = \boxed{\frac{6x}{x+3}}$$

$$\textcircled{3} \quad \frac{2x^2 - 3x - 5}{2x^2 - 7x + 5} = \frac{\cancel{(2x-5)}(x+1)}{\cancel{(2x-5)}(x-1)} = \boxed{\frac{x+1}{x-1}}$$

Dec 6-6:09 AM

$$\begin{aligned}
 \textcircled{4} \quad & \frac{x^2 - 5x - 14}{x^3 - 49x} \\
 = & \frac{x^2 - 5x - 14}{x(x^2 - 49)} \\
 = & \frac{(x+2)(\cancel{x-7})}{x(x+7)(\cancel{x-7})} \\
 = & \boxed{\frac{x+2}{x(x+7)}}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{5} \quad & \frac{3x^2 + 8x + 4}{3x^2 - 4x - 4} \\
 = & \frac{(\cancel{3x+2})(x+2)}{(\cancel{3x+2})(x-2)} \\
 = & \boxed{\frac{x+2}{x-2}}
 \end{aligned}$$

Dec 6-6:20 AM

$$\begin{aligned}
 \textcircled{6} \quad & \frac{x^4 + 27x}{x^3 - 3x^2 + 9x} = \frac{\cancel{x}(x^3 + 27)}{\cancel{x}(x^2 - 3x + 9)} \\
 = & \frac{x^3 + 3^3}{x^2 - 3x + 9} = \frac{(x+3)(\cancel{x^2 - 3x + 9})}{\cancel{x^2 - 3x + 9}} \\
 = & \frac{x+3}{1} = \boxed{x+3}
 \end{aligned}$$

Dec 6-6:29 AM

Excluded Values:

These are the values that make the denominator equal to zero.

How do we find excluded values?

① Denominator = 0

② Solve

Find all excluded values:

$$\frac{x+4}{x-10} \rightarrow x-10=0$$

$$\boxed{x=10} \text{ E.V. } 10$$

$$\frac{x-6}{2x+5} \rightarrow 2x+5=0$$

$$x = -\frac{5}{2}$$

$$\text{E.V. } -5/2$$

$$\frac{x+8}{x^2-8x+15}$$

$$\rightarrow x^2-8x+15=0$$

$$(x-3)(x-5)=0$$

By Z.F.P.

$$x-3=0$$

$$x=3$$

$$x-5=0$$

$$x=5$$

$$\rightarrow \text{E.V.: } 3, 5$$

Dec 6-6:35 AM

Find all excluded values:

$$\textcircled{1} \frac{6}{3x+5}$$

$$3x+5=0$$

$$\boxed{x = -\frac{5}{3}} \text{ E.V.: } -\frac{5}{3}$$

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

$$x^2+x-6=0$$

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

$$\boxed{x=-3}$$

$$\boxed{x=2}$$

$$\text{E.V.: } -3, 2$$

$$\textcircled{3} \frac{x^2-4x}{10}$$

$$10 \neq 0$$

NO E.V.

$$b^2-4ac = 5^2 - 4(2)(-12)$$

$$= 25 + 96$$

$$= 121$$

$$\textcircled{4} \frac{15}{2x^2+5x-12}$$

$$2x^2+5x-12=0$$

$$a=2 \quad b=5 \quad c=-12$$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{-5 \pm \sqrt{121}}{2(2)} = \frac{-5 \pm 11}{4}$$

$$\text{E.V. } -4 \text{ \& } \frac{3}{2}$$

$$x = \frac{3}{2}$$

$$x = -4$$

Dec 6-6:41 AM

Use quadratic formula to find all excluded values:

$$\textcircled{1} \frac{5x+2}{2x^2+11x+12}$$

$$2x^2 + 11x + 12 = 0$$

$$a=2 \quad b=11 \quad c=12$$

$$b^2 - 4ac = 11^2 - 4(2)(12) \\ = 121 - 96 = 25$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-11 \pm \sqrt{25}}{4} = \frac{-11 \pm 5}{4}$$

$$x = \frac{-11+5}{4}$$

$$= \frac{-6}{4}$$

$$= -\frac{3}{2}$$

E.V.:

$$-\frac{3}{2}, -4$$

$$x = \frac{-11-5}{4}$$

$$= \frac{-16}{4}$$

$$= -4$$

$$\textcircled{2} \frac{7-3x}{3x^2-7x+2}$$

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

$$a=3 \quad b=-7 \quad c=2$$

$$b^2 - 4ac = (-7)^2 - 4(3)(2) \\ = 49 - 24 = 25$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-7) \pm \sqrt{25}}{6}$$

$$= \frac{7 \pm 5}{6}$$

$$x = \frac{7+5}{6} = 2$$

$$x = \frac{7-5}{6}$$

E.V.

$$2 \frac{1}{3}, \frac{1}{3}$$

Dec 6-6:54 AM

Reduce: $\frac{4x+16}{10} \div \frac{3x+12}{18}$

$$= \frac{\cancel{4}(x+\cancel{4})}{\cancel{2} \cdot 5} \cdot \frac{\cancel{2} \cdot \cancel{3} \cdot 3}{\cancel{3}(x+\cancel{4})} = \boxed{\frac{12}{5}}$$

Reduce: $\frac{x^2-4}{8x-16} \div \frac{x^2+2x}{8}$

$$= \frac{\cancel{(x+2)}(\cancel{x-2})}{\cancel{8}(x-\cancel{2})} \cdot \frac{\cancel{8}^1}{\cancel{x}(x+\cancel{2})} = \boxed{\frac{1}{x}}$$

Dec 6-7:05 AM

Reduce:

$$\frac{2x^2 + 7x + 3}{x^2 - 9} \div \frac{2x^2 + 11x + 5}{x^2 - 3x}$$

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

$$= \boxed{\frac{x}{x+5}}$$

Dec 6-7:13 AM

Adding or Subtracting Rational expressions:

$$\frac{3x}{x+1} + \frac{3}{x+1} = \frac{3x+3}{x+1}$$

$$= \frac{3(x+1)}{x+1} = \boxed{3}$$

$$\frac{2y+5}{y+4} - \frac{y+1}{y+4} = \frac{2y+5-y-1}{y+4}$$

$$= \boxed{1}$$

Dec 6-7:51 AM

Reduce $\frac{x^2}{x-6} - \frac{36}{x-6}$

$$= \frac{x^2 - 36}{x-6} = \frac{(x+6)(\cancel{x-6})}{\cancel{x-6}}$$

Reduce

$$= \boxed{x+6}$$

$\frac{x^2 + 5x}{x^2 + 8x + 16} - \frac{x}{x^2 + 8x + 16}$

$$= \frac{x^2 + 5x - x}{x^2 + 8x + 16} = \frac{x^2 + 4x}{(x+4)(x+4)} = \frac{x(\cancel{x+4})}{(x+4)(\cancel{x+4})}$$

$\rightarrow \boxed{\frac{x}{x+4}}$

Dec 6-7:56 AM

Reduce $\frac{3}{x-2} - \frac{2}{x+5}$

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

$$= \frac{3(x+5) - 2(x-2)}{(x-2)(x+5)} = \frac{3x + 15 - 2x + 4}{(x-2)(x+5)}$$

$$= \boxed{\frac{x + 19}{(x-2)(x+5)}}$$

Dec 6-8:05 AM

Simplify: $\frac{5}{x-2} - \frac{3}{x+1}$

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

$$= \frac{5(x+1) - 3(x-2)}{(x-2)(x+1)} = \frac{5x+5-3x+6}{(x-2)(x+1)}$$

$$= \boxed{\frac{2x+11}{(x-2)(x+1)}}$$

Dec 6-8:08 AM

Simplify

$$\frac{2}{x^2+6x+5} - \frac{1}{x^2+4x+3}$$

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

$$= \frac{2(x+3) - 1(x+5)}{(x+5)(x+1)(x+3)} = \frac{2x+6-x-5}{(x+5)(x+1)(x+3)}$$

$$= \frac{\cancel{1}x + \cancel{1}}{(x+5)\cancel{(x+1)}(x+3)}$$

$$= \boxed{\frac{1}{(x+5)(x+3)}}$$

Dec 6-8:15 AM

Reduce $\frac{3}{x^2-4} - \frac{2}{x^2-5x+6}$

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

$$= \frac{3(x-3) - 2(x+2)}{(x+2)(x-2)(x-3)} = \frac{3x-9-2x-4}{(x+2)(x-2)(x-3)}$$

$$= \boxed{\frac{x-13}{(x+2)(x-2)(x-3)}}$$

Dec 6-8:20 AM

Reduce: $\frac{x}{x^2+3x-4} - \frac{2}{x^2+7x+12}$

$$= \frac{x(x+3)}{(x+4)(x-1)(x+3)} - \frac{2(x-1)}{(x+4)(x+3)(x-1)}$$

$$= \frac{x(x+3) - 2(x-1)}{(x+4)(x-1)(x+3)} = \frac{x^2+3x-2x+2}{(x+4)(x-1)(x+3)}$$

$$= \boxed{\frac{x^2+x+2}{(x+4)(x-1)(x+3)}}$$

Dec 6-8:28 AM

Reduce:

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

$$\frac{6(x-1)}{x(x+3)(x-1)} - \frac{1(x+3)}{x(x-1)(x+3)} + \frac{2x}{(x-1)(x+3)x}$$

$$= \frac{6(x-1) - 1(x+3) + 2x}{x(x+3)(x-1)} = \frac{6x-6-x-3+2x}{x(x+3)(x-1)} = \frac{7x-9}{x(x+3)(x-1)}$$

Dec 6-8:35 AM

Reduce: $\frac{x}{x^2-1} - \frac{x-1}{x^2+2x+1}$

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

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

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

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

Dec 6-8:42 AM

Basic Math

Reduce $\frac{1 - \frac{1}{2}}{1 + \frac{1}{3}} = \frac{6 \cdot 1 - 6 \cdot \frac{1}{2}}{6 \cdot 1 + 6 \cdot \frac{1}{3}}$

LCD = 6

$$= \frac{6 - 3}{6 + 2} = \boxed{\frac{3}{8}}$$

Simplify $\frac{1 - \frac{2}{x}}{x - \frac{4}{x}} = \frac{x \cdot 1 - x \cdot \frac{2}{x}}{x \cdot x - x \cdot \frac{4}{x}} = \frac{x - 2}{x^2 - 4}$

$\boxed{\frac{1}{x+2}}$ $\leftarrow$

LCD = x

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

Dec 6-8:50 AM

Reduce: $\frac{x - \frac{9}{x}}{x - 6 + \frac{9}{x}} = \frac{x^2 - 9}{x^2 - 6x + 9}$

LCD = x

$$= \frac{(x+3)(\cancel{x-3})}{(x-3)(\cancel{x-3})}$$

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

Dec 6-8:55 AM

Graph of $y = 4x^2 - 5x - 9$ has two x -Ints. Find them.

$$\begin{aligned} y=0 &\rightarrow 4x^2 - 5x - 9 = 0 \\ a=4 \quad b=-5 \quad c=-9 \end{aligned}$$

$$b^2 - 4ac = (-5)^2 - 4(4)(-9) = 25 + 144 = 169$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-5) \pm \sqrt{169}}{8} = \frac{5 \pm 13}{8}$$

$$x = \frac{5+13}{8} = \frac{18}{8} = \frac{9}{4} \quad x = \frac{5-13}{8} = \frac{-8}{8} = -1$$

x -Int $(-1, 0)$
 $(\frac{9}{4}, 0)$

Dec 6-9:00 AM

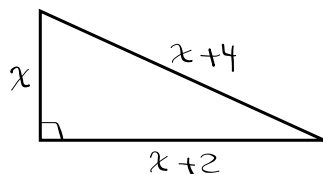
3 Sides of a right triangle are 3
 Cons. even integers.

Find

1) all 3 sides

2) Perimeter

3) Area



By Pythagorean Thm

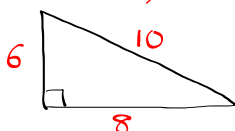
$$x^2 + (x+2)^2 = (x+4)^2$$

$$x^2 + 4x + 4 - 8x - 16 = 0$$

$$x^2 - 4x - 12 = 0$$

$$(x-6)(x+2) = 0$$

$$x=6 \quad \cancel{x=-2}$$



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

$$x^2 + x^2 + 4x + 4 = x^2 + 8x + 16$$

$$A = \frac{6 \cdot 8}{2} = 24 \text{ unit}^2$$

$$P = 6 + 8 + 10 = 24 \text{ unit}$$

Dec 6-9:04 AM