Mth 098 – Intermediate Algebra – **Practice Exam 5 Solutions**

1. The domain of a rational function is any value except those that make the denominator zero. We need to solve the equation $x^3+4x=0$.

$x^3+4x=0 \quad \Rightarrow \quad x\left(x^2+4\right)=0 \quad \Rightarrow \quad x=0 \quad or \quad x^2+4=0$

$x^2+4=0$ has no solutions, so the domain is $\{x \mid x \neq 0\}$.

2.

a. $\dfrac{x^2-2x}{2-x}=\dfrac{x(x-2)}{2-x}=\dfrac{x(x-2)}{-1(x-2)}=\dfrac{x}{-1}=-x$

b. $\dfrac{p^2-2p-24}{p-6}=\dfrac{(p-6)(p+4)}{p-6}=p+4$

3.

$$\frac{x^2+12x+35}{x^2+4x-5}\cdot\frac{x-1}{x^2+3x-28}=\frac{x^2+12x+35}{x^2+4x-5}\cdot\frac{x-1}{x^2+3x-28}$$

$$=\frac{(x+5)(x+7)}{(x+5)(x-1)}\cdot\frac{x-1}{(x+7)(x-4)}=\frac{1}{(x-4)}$$

4. $(x-3)\div\dfrac{x^2+3x-18}{x^2}=\dfrac{x-3}{1}\cdot\dfrac{x^2}{x^2+3x-18}=\dfrac{x-3}{1}\cdot\dfrac{x^2}{(x+6)(x-3)}=\dfrac{x^2}{x+6}$

5.

a.

$x+2=(x+2)$

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

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

$LCD=(x+2)(x-1)^2$

b.

$12x^2y=2^2\cdot 3\cdot x^2\cdot y$

$18y^3=2\cdot 3^2\cdot y^3$

$LCD=2^2\cdot 3^2\cdot x^2\cdot y^3=36x^2y^3$

6.

$$x+1=(x+1)$$
$$x^2-1=(x+1)(x-1)$$
$$LCD=(x+1)(x-1)$$
$$\frac{x}{x+1}\cdot\frac{\quad}{\quad}=\frac{\quad}{(x+1)(x-1)} \quad\Rightarrow\quad \frac{x}{x+1}\cdot\frac{x-1}{x-1}=\frac{x^2-x}{(x+1)(x-1)}$$
$$\frac{x}{x+1}-\frac{2}{x^2-1}=\frac{x^2-x}{(x+1)(x-1)}-\frac{2}{(x+1)(x-1)}=\frac{x^2-x-2}{(x+1)(x-1)}=\frac{(x-2)(x+1)}{(x+1)(x-1)}=\frac{x-2}{x-1}$$

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

8.

$$x-1=(x-1)$$
$$x^2+5x-6=(x+6)(x-1)$$
$$LCD=(x+6)(x-1)$$
$$\frac{x}{x-1}\cdot\frac{\quad}{\quad}=\frac{\quad}{x^2+5x-6} \quad\Rightarrow\quad \frac{x}{x-1}\cdot\frac{x+6}{x+6}=\frac{x^2+6x}{(x+6)(x-1)}$$
$$\frac{x}{x-1}-\frac{7}{x^2+5x-6}=\frac{x^2+6x}{(x+6)(x-1)}-\frac{7}{(x+6)(x-1)}=\frac{x^2+6x-7}{(x+6)(x-1)}=\frac{(x+7)(x-1)}{(x+6)(x-1)}=\frac{x+7}{x+6}$$

9.

$$LCD=x^2$$
$$\frac{\left(\frac{2}{x}-\frac{2}{x^2}\right)x^2}{\left(1-\frac{1}{x}\right)x^2}=\frac{\frac{2}{x}\cdot x^2-\frac{2}{x^2}\cdot x^2}{1\cdot x^2-\frac{1}{x}\cdot x^2}=\frac{2x-2}{x^2-x}=\frac{2(x-1)}{x(x-1)}=\frac{2}{x}$$

10.

$$LCD=xy$$
$$\frac{\left(\frac{x}{y}-\frac{y}{x}\right)xy}{\left(\frac{x+y}{x}\right)xy}=\frac{\frac{x}{y}\cdot xy-\frac{y}{x}\cdot xy}{\frac{x+y}{x}\cdot xy}=\frac{x^2-y^2}{(x+y)y}=\frac{(x+y)(x-y)}{(x+y)y}=\frac{x-y}{y}\cdot$$

11. Since this is a proportion, we can cross multiply.

$$(x-1)(x-5)=4(x-5)$$
$$x^2-6x+5=4x-20$$
$$x^2-10x+25=0$$
$$(x-5)^2=0 \quad \Rightarrow \quad x-5=0 \qquad x=5$$

When we check, however, we see that the denominator $x-5$ is equal to zero when $x=5$, so this equation has no solution.

12.
$$LCD = x$$
$$x\left(x+\frac{6}{x}\right)=x(-5)$$
$$x\cdot x+x\cdot\frac{6}{x}=-5x \quad \Rightarrow \quad x^2+6=-5x$$
$$x^2+5x+6=0 \quad \Rightarrow \quad (x+3)(x+2)=0$$
$$x+3=0 \quad \Rightarrow \quad x=-3$$
$$x+2=0 \quad \Rightarrow \quad x=-2$$

So the solution set is: $\{-3,-2\}$

13. Since these triangles are similar, we can set up the proportion:

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

Cross multiplying:

$$(x+2)(x-1)=5\cdot 2$$
$$x^2+x-2=10$$
$$x^2+x-12=0$$
$$(x+4)(x-3)=0$$

$$x+4=0 \quad \Rightarrow \quad x=-4$$

or

$$x-3=0 \quad \Rightarrow \quad x=3$$

Since $x+2$ and $x-1$ represent lengths, $x=-4$ is not possible, so the solution is $x=3$.