

PC11 Ch 6 Hand-in Partial Key

Sunday, March 5, 2023 4:23 PM



PC11 Ch 6 Hand-in 2023

PreCalc 11 Chapter 6 Assignment – hand in for completion marks

Name: Key

Complete the following questions showing all work and steps where applicable.

1. Simplify the rational expressions. State the non-permissible values (restrictions) for each.

Factor everything!

$$a) \frac{x^2 - 8x + 15}{2x^2 - 9x - 5}$$

$$= \frac{(x-3)(x-5)}{2x^2 - 10x + 1x - 5}$$

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

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

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

NPV

$$\begin{aligned} 2x+1 &\neq 0 & x-5 &\neq 0 \\ 2x &\neq -1 & x &\neq 5 \\ x &\neq -\frac{1}{2} & & \end{aligned}$$

NPVs

$$\begin{aligned} x &\neq -\frac{1}{2} \\ x &\neq 5 \end{aligned}$$

AC = -10
Product = -10
Sum = -9
-10, 1

$$b) \frac{18-2x^2}{x^2+6x+9}$$

2. Simplify the rational expressions. State the non-permissible values (restrictions) for each:

$$a) \frac{x+2}{x^2-2x-15} \cdot \frac{x-5}{2x+4}$$

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

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

NPV

$$\begin{aligned} x &\neq -2 \\ x &\neq -3 \\ x &\neq 5 \end{aligned}$$

$$b) \frac{2x^2+15x+7}{x^2-5x-14} \div \frac{12x+6}{x^2-4}$$

AC = 14
1, 14

$$\frac{2x^2+14x+(x+7)}{(x+2)(x-7)} \cdot \frac{x^2-4}{12x+6}$$

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

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

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

NPVs:

$$\begin{aligned} x &\neq -2 \\ x &\neq 7 \\ x &\neq -\frac{1}{2} \\ x &\neq 2 \end{aligned}$$

3. Simplify the rational expressions. State the non-permissible values (restrictions) for each:

a) $\frac{2t+3}{6t} + 4 - \frac{t+1}{t^2}$ LCD = $6t^2$

$$\frac{t}{t} \cdot \frac{2t+3}{6t} + \frac{4}{1} \cdot \frac{6t^2}{6t^2} - \frac{(t+1) \cdot 6}{t^2 \cdot 6}$$

$$\frac{t(2t+3) + 4(6t^2) - 6(t+1)}{6t^2}$$

$$= \frac{2t^2 + 3t + 24t^2 - 6t - 6}{6t^2}$$

$$= \frac{26t^2 - 3t - 6}{6t^2} \quad \text{and} \quad \text{NPV } t \neq 0$$

b) $\frac{8}{x^2-2x-3} - \frac{x-1}{x-3}$

$$\frac{8}{(x+1)(x-3)} - \frac{(x-1)}{(x-3)} \quad \text{LCD} = (x+1)(x-3)$$

$$= \frac{8}{(x+1)(x-3)} - \frac{(x-1) \cdot (x+1)}{(x-3) \cdot (x+1)}$$

$$= \frac{8 - (x-1)(x+1)}{(x+1)(x-3)}$$

$$= \frac{8 - (x^2 - 1x + 1x - 1)}{(x+1)(x-3)}$$

$$= \frac{8 - x^2 + 1}{(x+1)(x-3)}$$

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

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

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

$$= \frac{-1(3+x)}{x+1} \quad \text{or} \quad \frac{-3-x}{x+1}$$

and NPV $x \neq -1$
 $x \neq 3$

4. Solve the following rational equations

- list the non-permissible values (restrictions)
- identify any extraneous roots

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

b) $\frac{2x+1}{x-1} - \frac{3x}{x+2} = \frac{18}{x^2+x-2}$

$$\frac{2x+1}{x-1} - \frac{3x}{x+2} = \frac{18}{(x-1)(x+2)}$$

Multiply by LCD

$$(x-1)(x+2) \left[\frac{2x+1}{x-1} \right] - (x-1)(x+2) \left[\frac{3x}{x+2} \right] = (x-1)(x+2) \left[\frac{18}{(x-1)(x+2)} \right]$$

$$(2x+1)(x+2) - 3x(x-1) = 18$$

$$2x^2 + 4x + 1x + 2 - 3x^2 + 3x - 18 = 0$$

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

$$-1(x^2 - 8x + 16) = 0$$

$$-1(x-4)(x-4) = 0$$

$$x = 4$$

$$\text{NPVs are } x \neq 1 \\ x \neq -2$$

For each question below, write an equation to model the situation, then solve it.

5. A boat travels 45 km downstream in the same amount of time that it takes to travel 30 km upstream. If the speed of the boat in still water is 12 km/h, find the speed of the current.

	Distance	Rate	Time
Downstream	45	$12 + x$	$\frac{45}{12+x}$
Upstream	30	$12 - x$	$\frac{30}{12-x}$

let $x =$
Speed
of
current

$$D = RT$$

so

$$\frac{D}{R} = T$$

$$\text{time downstream} = \text{time upstream}$$

$$\frac{45}{12+x} = \frac{30}{12-x}$$

$$45(12-x) = 30(12+x)$$

$$540 - 45x = 360 + 30x$$

$$540 - 75x = 360$$

$$\frac{-75x}{-75} = \frac{-180}{-75}$$

$$x = 2.4 \text{ km/h}$$

6. John can paint a shed in 5 hours. When he and his sister Meg work together, they can paint the same shed in 2 hours. How long will it take Meg to paint the shed if she works alone?

	time for whole job	fraction done in 1 hour
John	5	$\frac{1}{5}$
Meg	x	$\frac{1}{x}$
together	2	$\frac{1}{2}$

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

$$\text{LCD} = 10x$$

$$10x \left(\frac{1}{5} \right) + 10x \left(\frac{1}{x} \right) = 10x \left(\frac{1}{2} \right)$$

$$2x + 10 = 5x$$

$$\frac{10}{3} = \frac{3x}{3}$$

$$x = \frac{10}{3} \text{ hours}$$

or $3\frac{1}{3}$ hours

7. How many grams of almonds should be added to 690 grams of walnuts to make a nut mixture that is 70% almonds?

$$\frac{70}{100} = \frac{\text{almonds}}{\text{total volume}}$$

~~$$\frac{70}{100} = \frac{A}{A+690}$$~~

$$70(A+690) = 100A$$

$$\begin{array}{r} 70A + 48300 = 100A \\ -70A \qquad \qquad -70A \end{array}$$

$$\frac{48300}{30} = \frac{30A}{30}$$

$$\boxed{1610 \text{ grams}} = A$$

$$\begin{aligned} \text{check: } \frac{1610}{1610+690} &= \frac{1610}{2300} \quad \checkmark \\ &= 0.70 \text{ or } 70\% \end{aligned}$$