

## Math 12 – Workshop #14

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1. Simplify using any method. Assume no denominators are zero.

(a)  $\frac{\frac{2}{6}}{\frac{9}{12}}$

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

(b)  $\frac{\frac{2x^3}{5}}{\frac{4x}{15}}$

(d)  $\frac{\frac{1}{x} + \frac{1}{y}}{x + y}$

2. (a) Pick values for  $a$  and  $b$  to show the following statement is false

$$\frac{1}{\frac{1}{a} + \frac{1}{b}} = a + b.$$

(b) Simplify  $\frac{1}{\frac{1}{a} - \frac{1}{b}}$  as much as possible.

3. Simplify the following expressions as much as possible

(a)  $\frac{\frac{1}{x+y} - \frac{1}{x}}{y}$

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

(b)  $\frac{\frac{1}{2(x+y)+1} - \frac{1}{2x+1}}{y}$

(d)  $(x - 1 - 2x^{-1})^{-1} \cdot \left(\frac{x}{3}\right)$

4. In functional analysis the the function space  $L^p$  is said to be the *dual space* of  $L^q$  if  $p$  and  $q$  are related as follows:

$$\frac{1}{p} + \frac{1}{q} = 1.$$

(a) Find  $p$  if  $q = 2$ .

(b) Find  $q$  if  $p = 7$ .

(c) Solve for  $p$  in terms of  $q$ .

5. Do the following two equations have the same solutions? Why or why not?

(a)  $x^2 + 12x + 27 = 0$

(b)  $x + 5 - \frac{26}{x+9} = \frac{2x-8}{x+9}$

6. Solve the following assume no denominators are zero. Are there any extraneous solutions?

(a)  $\frac{5}{x+4} - \frac{1}{3} = \frac{x-1}{x}$

(b)  $1 = \frac{3}{x-2} - \frac{12}{x^2-4}$

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

7. A website has a promotional price where new subscribers pay \$360 for a set number of months. After this promotional period ends the price per month increases by \$5. Now it costs the same price for one less month.
- (a) Let  $x$  be the number of months during the promotional period. Express the price per month during the promotional period as a fraction using  $x$ .
  - (b) Express the price per month after the promotional period as a fraction using  $x$ .
  - (c) What does the problem say we should get when we subtract our answer to part (a) from our answer to part (b)?
  - (d) How many months did \$360 buy before the price increase? Hint: Turn your answer from part (c) into a radical equation and solve.