

MATH 95  
EXAM 5

Name Key

Answer all questions and **show all work**. Clearly indicate all answers. Choose the best answer for multiple choice questions, but **all work must be shown for full credit**. Each problem is equally weighted. Good luck!

1. List all numbers for which the expression is undefined:

$$\frac{41}{x-29}$$

- a. -29    b. 0

$$x - 29 = 0$$

$$x = 29$$

c. 29    d. 41

1. C

2. List all numbers for which the expression is undefined:

$$\frac{t+3}{t^2-2t-35}$$

- a. -3

- b. -5, 7

- c. -5, -3, 7

- d. 7

$$(t-7)(t+5) = 0$$

$$t = 7, t = -5$$

2. B

3. Simplify:  $\frac{80x^3y^5}{5x^6y^4}$

$$= \frac{16y}{x^3}$$

3.  $\frac{16y}{x^3}$

4. Simplify:  $\frac{4x^2-11x+6}{2x^2-3x-2}$

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

4. A

- a.  $\frac{4x-3}{2x+1}$

- b.  $\frac{4x+3}{2x+1}$

- c.  $\frac{4x+3}{2x-1}$

- d.  $\frac{4x-3}{2x-1}$

5. Find the LCD:

$$\frac{1}{y^2-64}, \frac{1}{y^2+5y-24}, \frac{1}{y^2+7y-8}$$

$$(y+8)(y-8) \quad (y+8)(y-3) \quad (y+8)(y-1)$$

- a.  $y+8$

- b.  $(y-8)(y+8)$

- c.  $(y-8)(y-3)(y+8)$

- d.  $(y-8)(y-3)(y-1)(y+8)$

5. D

PERFORM THE FOLLOWING OPERATIONS AND SIMPLIFY IF POSSIBLE:

6.  $\frac{x^2 + 8x + 15}{x^2 - 1} \cdot \frac{x+1}{x+5}$

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

6.  $\frac{x+3}{x-1}$

7.  $\frac{a+b}{3a} \div \frac{a^2-b^2}{9a^3}$

$$\frac{(a+b)(9a^3)}{3a(a-b)(a+b)} = \frac{3a^2}{a-b}$$

7.  $\frac{3a^2}{a-b}$

8.  $(x^2 + 4x + 4) \div \frac{x^2 - 4}{(x-2)^2}$

a.  $\frac{(x+2)^3}{(x-2)}$

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

c.  $\frac{(x+2)^3}{(x+2)}$

d.  $(x+2)(x-2)$

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

8. D

9.  $\frac{3x}{x+3} + \frac{x^2}{x+3}$

a. x

b.  $x+3$

c.  $\frac{x}{x+3}$

d.  $x-3$

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

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

9. A

10.  $\frac{4}{t-5} + \frac{8}{t}$

a.  $\frac{12}{2t-5}$

b.  $\frac{4(3t-10)}{t(t-5)}$

c.  $\frac{4(3t+10)}{t(t-5)}$

d.  $\frac{12}{t(t-5)}$

$$\frac{t}{t} \left( \frac{4}{t-5} \right) + \frac{t-5}{t-5} \left( \frac{8}{t} \right)$$

$$= \frac{4t + 8t - 40}{t(t-5)}$$

$$= \frac{12t - 40}{t(t-5)} = \frac{4(3t-10)}{t(t-5)}$$

10. B

11.  $\frac{5a^2 - b^2}{a - b} - \frac{4a^2}{b - a}$

- a.  $a - b$
- b.  $-a - b$
- c.  $\frac{9a^2 - b^2}{a - b}$
- d.  $9a - b$

$$\frac{5a^2 - b^2}{a - b} + \frac{4a^2}{a - b} = \frac{9a^2 - b^2}{a - b}$$

11. C

12.  $\frac{x - 3}{x - 6} - \frac{x + 1}{6 - x}$

a.  $\frac{-12}{x - 6}$

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

b.  $\frac{2x - 2}{x - 6}$

c.  $\frac{-2}{x - 6}$

12. B

13.  $\frac{1}{x^2 - 25} - \frac{x + 3}{x^2 + 3x - 10}$

a.  $\frac{-x^2 + 3x + 13}{(x + 5)(x - 5)(x - 2)}$

b.  $\frac{-x^2 - 4x - 17}{(x + 5)(x - 5)(x - 2)}$

c.  $\frac{-x^2 - 7x - 13}{(x + 5)(x - 5)(x + 2)}$

d.  $\frac{-x - 2}{(x + 5)(x - 5)(x + 2)}$

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

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

$$\frac{x - 2 - x^2 + 5x - 3x + 15}{(x - 5)(x + 5)(x - 2)} = \frac{-x^2 + 3x + 13}{(x - 5)(x + 5)(x - 2)}$$

13. A

14.  $\frac{3x - 1}{x^2 - 2x - 8} - \frac{x}{x + 2} + \frac{2}{x - 4}$

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

a.  $\frac{-x^2 + 3x + 5}{(x + 2)(x - 4)}$

b.  $\frac{2x + 1}{(x + 2)(x - 4)}$

c.  $\frac{-x^2 + 9x + 3}{(x + 2)(x - 4)}$

d.  $\frac{x + 9}{(x + 2)(x - 4)}$

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

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

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

14. C

$$7(4x-3) = 3(3x+2)$$

15. Solve:  $\frac{7}{3x+2} = \frac{3}{4x-3}$

$$28x - 21 = 9x + 6 \quad 15. \quad \underline{D}$$

$$19x = 27$$

$$x = \frac{27}{19}$$

a.  $\frac{25}{22}$

b.  $\frac{9}{25}$

c.  $\frac{-17}{22}$

d.  $\frac{27}{19}$

16. Solve:  $\frac{12}{y} - \frac{1}{4} = \frac{5}{12}$

$$12y\left(\frac{12}{y}\right) - 12y\left(\frac{1}{4}\right) = \left(\frac{5}{12}\right) 12y \quad 16. \quad \underline{B}$$

a. 12

b. 18

c. 3

d. 16

$$144 - 3y = 5y$$

$$144 = 8y$$

$$y = \frac{144}{8} = 18$$

17. Solve:  $\frac{t+4}{t^2+2t-15} + \frac{2}{t-3} = \frac{4}{t+5}$

17. A

a. 26

b. 21

c. 12

d. 17

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

$$t+4 + 2(t+5) = 4(t-3)$$

$$t+4 + 2t + 10 = 4t - 12$$

$$3t + 14 = 4t - 12$$

$$t = 26$$

18. 1, -1

18. Solve:  $\frac{9}{x} - \frac{8}{x-1} = -1$

$$\frac{9}{x}(x)(x-1) + \frac{-8}{x-1}(x)(x-1) = -1(x)(x-1)$$

$$9x - 9 - 8x + 8 = -x^2 + x$$

$$x^2 - 1 = 0 \quad (x-1)(x+1) = 0$$

19. The reciprocal of 5 minus the reciprocal of 8 is the reciprocal of what number?

a.  $\frac{3}{40}$

b.  $\frac{40}{13}$

c.  $\frac{40}{3}$

d.  $\frac{13}{40}$

$$8x - 5x = 40$$

$$3x = 40$$

$$x = \frac{40}{3}$$

$$\frac{1}{5} - \frac{1}{8} = \frac{1}{x}$$

$$40\left(\frac{1}{5}\right) - 40\left(\frac{1}{8}\right) = 40x\left(\frac{1}{x}\right)$$

20. A sample of 38 cell phones contained 2 defective ones. How many defective cell phones would you expect in a batch of 570?

- a. 75
- b. 30
- c. 35
- d. 15

$$\frac{2}{38} = \frac{x}{570}$$

$$1140 = 38x$$

$$30 = x$$

21. Bill can mow the yard in 4 hours. Janet can mow the yard in 2 hours. How long will it take them, working together, to mow the yard?

- a. 1 1/3 hours
- b. 3/4 hour
- c. 3 hours
- d. 1 1/2 hours

$$\frac{x}{4} + \frac{x}{2} = 1$$

$$4\left(\frac{x}{4}\right) + 4\left(\frac{x}{2}\right) = 4(1)$$

$$x + 2x = 4$$

$$3x = 4$$

$$x = \frac{4}{3} = 1\frac{1}{3}$$

22. A police cruiser on a highway chase passes Luther in his pickup truck. The policeman is driving 18 mph faster than Luther. In the time that Luther drives 10 miles, the policeman drives 13 miles. What is the speed of the police cruiser?

- a. 73 mph
- b. 68 mph
- c. 78 mph
- d. 82 mph

$$D = r \times t$$

L	10	$\cdot r$	$\frac{10}{r}$
P	13	$r+18$	$\frac{13}{r+18}$

$$\frac{10}{r} = \frac{13}{r+18}$$

$$10r + 180 = 13r$$

$$180 = 3r$$

$$60 = r$$

$$r + 18 =$$

$$60 + 18 = 78$$

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Answer all questions and **show all work**. Clearly indicate all answers. Choose the best answer for multiple choice questions, but **all work must be shown for full credit**. Each problem is equally weighted. Good luck!

1. List all numbers for which the expression is undefined:

$$\frac{65}{x-44}$$

$$x - 44 = 0$$

$$x = 44$$

- a. -44    b. 65    c. 44    d. 0

1. C

2. List all numbers for which the expression is undefined:

$$\frac{t-1}{t^2+4t-45}$$

$$(x+9)(x-5) = 0$$

$$x = -9, x = 5$$

- a. 1    b. -9    c. -9, 1, 5    d. -9, 5

2. D

3. Simplify:  $\frac{80x^3y^5}{5x^6y^4}$

$$\frac{16y}{x^3}$$

3.  $\frac{16y}{x^3}$

4. Simplify:  $\frac{6x^2+x-15}{4x^2-16x+15} = \frac{(2x-3)(3x+5)}{(2x-3)(2x+5)}$

- a.  $\frac{3x-5}{2x+5}$     b.  $\frac{3x-5}{2x-5}$     c.  $\frac{3x+5}{2x+5}$     d.  $\frac{3x+5}{2x-5}$

4. D

5. Find the LCD:

$$\frac{1}{y^2-1}, \frac{1}{y^2+6y+5}, \frac{1}{y^2+4y-5}$$

$$(y-1)(y+1) \quad (y+5)(y+1)$$

- a.  $y+1$   
b.  $(y+5)(y+1)(y+5)$   
c.  $(y-1)^2(y+1)^2(y+5)(y-5)$   
d.  $(y-1)(y+1)(y-5)(y+5)$

5.  $(y-1)(y+1)(y+5)$

none

D + 2

PERFORM THE FOLLOWING OPERATIONS AND SIMPLIFY IF POSSIBLE:

6.  $\frac{x^2+8x+15}{x^2-1} \cdot \frac{x+1}{x+5}$   $\frac{(x+5)(x+3)(x+1)}{(x-1)(x+1)(x+5)}$  6.  $\frac{x+3}{x-1}$

7.  $\frac{a+b}{3a} \div \frac{a^2-b^2}{9a^3}$   $\frac{(a+b)(9a^3)}{3a(a+b)(a-b)}$  7.  $\frac{3a^2}{(a-b)}$   
 $= \frac{9a^2}{3a(a-b)}$

8.  $(x^2+8x+16) \div \frac{x^2-16}{(x-4)^2}$  8. D  
 $\frac{(x+4)(x+4)(x-4)(x-4)}{(x+4)(x-4)}$

- a.  $\frac{(x-4)^3}{(x+4)}$   
 b.  $\frac{1}{(x+4)(x-4)}$   
 c.  $\frac{(x+4)^3}{(x-4)}$   
 d.  $(x+4)(x-4)$

9.  $\frac{5x}{x+5} + \frac{x^2}{x+5}$  9. D  
 $\frac{x^2+5x}{x+5} = \frac{x(x+5)}{x+5} = x$

10.  $\frac{4}{t-6} + \frac{6}{t}$   $\frac{t \cancel{(t-6)} (\frac{4}{t-6}) + \cancel{t} (t-6) (\frac{6}{t})}{t(t-6)}$  10. D

a.  $\frac{10}{2t-6}$  c.  $\frac{-2(3t+16)}{t(t-6)} = \frac{4t}{t(t-6)} + \frac{6t-3b}{t(t-6)}$   
 b.  $\frac{10}{t(t-6)}$  d.  $\frac{2(5t-18)}{t(t-6)} = \frac{10t-3b}{t(t-6)} = \frac{2(5t-18)}{t(t-6)}$

$$\frac{3a+ab-4a}{a-b}$$

11.  $\frac{3a+ab}{a-b} - \frac{4a}{b-a}$

a.  $\frac{7a+ab}{a-b}$

b.  $\frac{a^2+ab}{a-b}$

c.  $\frac{ab-a}{a-b}$

d.  $\frac{7a-ab}{a-b}$

$$\frac{-a+ab}{a-b}$$

11. C

12.  $\frac{x+3}{x-5} - \frac{x-2}{5-x}$

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

a.  $\frac{2x+5}{x-5}$

b.  $\frac{1}{x-5}$

c.  $\frac{2x+1}{x-5}$

12. C

d.  $\frac{5}{x-5}$

13.  $\frac{1}{x^2-4} - \frac{x+5}{x^2-4x-12}$

a.  $\frac{-x^2+4x-16}{(x+2)(x-2)(x-6)}$

b.  $\frac{-11}{(x+2)(x-2)(x-6)}$

c.  $\frac{-x-4}{(x+2)(x-2)(x-6)}$

d.  $\frac{-x^2-2x+4}{(x+2)(x-2)(x-6)}$

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

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

$$= \frac{x-6 - x^2 + 2x - 5x + 10}{(x-2)(x+2)(x-6)} = \frac{-x^2 - 2x + 4}{(x-2)(x+2)(x-6)}$$

13. D

14.  $\frac{3x-7}{x^2-14x+48} - \frac{4}{x-8} + \frac{9}{x-6}$

a.  $\frac{8x-12}{(x-8)(x-6)}$

b.  $\frac{8x-7}{(x-8)(x-6)}$

c.  $\frac{8x-23}{(x-8)(x-6)}$

d.  $\frac{8x-55}{(x+2)(x-4)}$

$\frac{8x-55}{(x-8)(x-6)}$

$$\frac{3x-7 - 4(x-6) + 9(x-8)}{(x-6)(x-8)}$$

$$= \frac{3x-7-4x+24+9x-72}{(x-6)(x-8)}$$

$$= \frac{8x-55}{(x-8)(x-6)}$$

14. D or  $\frac{8x-55}{(x-8)(x-6)}$

$$7(4x-3) = 3(3x+2)$$

$$28x - 21 = 9x + 6$$

$$19x = 27$$

15. Solve:  $\frac{7}{3x+2} = \frac{3}{4x-3}$

15. D

a.  $\frac{25}{22}$

b.  $\frac{9}{25}$

c.  $\frac{-17}{22}$

d.  $\frac{27}{19}$

16. Solve:  $\frac{11}{y} - \frac{2}{3} = \frac{1}{4}$

$$12y\left(\frac{11}{y}\right) + 12y\left(\frac{-2}{3}\right) = 12y\left(\frac{1}{4}\right)$$

16. A

a. 12

b. -12

c. 7

d. 24

$$132 + -8y = 3y$$

$$132 = 11y$$

$$y = 12$$

17. Solve:  $\frac{t-5}{t^2+6t-7} + \frac{3}{t+7} = \frac{6}{t-1}$

17. B

a.  $-\frac{13}{2}$

b. -25

c. -11

d. 16

$$\frac{(t-5)}{(t+7)(t-1)} + \frac{3}{(t+7)} = \frac{6}{(t-1)}$$

$$t-5 + 3t-3 = 6t+42$$

$$-50 = 2t$$

$$t = -25$$

18. Solve:  $\frac{10}{x} - \frac{9}{x-1} = -2$

18.  $x = -2, \frac{5}{2}$

$$x(x-1)\left(\frac{10}{x}\right) + (x)(x-1)\left(\frac{-9}{x-1}\right) = -2(x)(x-1)$$

$$10x - 10 + -9x = -2x^2 + 2x$$

$$2x^2 - x - 10 = 0$$

$$(2x - 5)(x + 2) = 0$$

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

19. The reciprocal of 5 minus the reciprocal of 8 is the reciprocal of what number?

a.  $\frac{3}{40}$

b.  $\frac{40}{13}$

c.  $\frac{40}{3}$

d.  $\frac{13}{40}$