

## Math 101 Review for Final Exam

### Unit 1

- Solve:  $2(x+4)+3=7x+21$
- Solve:  $\frac{1}{3}x+\frac{11}{15}=\frac{1}{2}x+\frac{3}{5}$
- Solve for  $F$ :  $\frac{1}{E+F}=G$ 
  - $1-E=F$
  - $\frac{1-GE}{G}=F$
  - $\frac{1+GE}{G}=F$
  - $\frac{1}{E+G}=F$
- Find the area of a circle whose circumference is  $6\pi$ .
  - $9\pi$
  - $3\pi^2$
  - $36\pi$
  - $9\pi^2$
- After a 40% reduction, a shirt is on sale for \$9. What was the original price?
- Two stock investments cost \$15,000. One stock then had a 40% gain and the other a 10% loss. If the net profit is \$2000, how much was invested in each stock?
- Solve:  $6-13y < 4-12y$
- A “dial-around” long distance phone company charges 3 cents per minute, plus 30 cents to connect. Melissa’s normal long distance carrier charges a flat rate of 7 cents per minute. For what call times will Melissa save money with the dial-around company?
- Determine which ordered pair is a solution of the linear equation  $3x-6y=9$ 
  - $(-1,1)$
  - $(6,3)$
  - $(9,2)$
  - $(1,-1)$
- Find the x-intercept and the y-intercept of  $3x-6y=9$ .

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### Unit 2

11. Subtract  $(-2x - 4x^2 + 5)$  from  $(3x^2 - 6x + 3)$
12. Multiply:  $(2a + 3)(5a^3 - 6a^2 - 2)$
13. Find the square:  $(4x - 5y)^2$
14. Divide:  $(15x^3 - 16x^2 + 7x - 4) \div (3x - 2)$
15. Multiply:  $(2m + 3)(2m - 3)$   
a.  $4m^2 - 12m + 9$     b.  $4m^2 - 6m - 9$     c.  $4m^2 + 9$     d.  $4m^2 - 9$     e. None of these
16. Divide:  $\frac{6x^3 - 4x^2 - 2x}{-2x}$   
a.  $4x^2 + 2x + 1$     b.  $-3x^2 + 2x + 1$     c.  $-3x^2 + 2x$     d.  $4x^2 - 2x - 4$     e. None of these
17. Simplify:  $(-4)^{-3}$   
a. 12    b. 64    c. -64    d.  $\frac{-1}{12}$     e.  $\frac{-1}{64}$
18. Simplify  $(w^2 y^5)^4$
19. Simplify:  $\frac{5x^3 (-x^4 y)^6}{(2xy^3)^2}$
20. Simplify:  $\left(\frac{a^0 b^{-2}}{a^6 b^{-6} a^{-4}}\right)^{-2}$

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### Unit 3

Problems 21-26, factor each the following completely.

21.  $10t^3 - 2t^2s^2 - 5ts + s^3$

22.  $12k^5 - 6k^3 + 10k^2$

23.  $14a^2b^3 + 15ab^3 - 9b^3$

24.  $81x^4 - 16$

25.  $m^3 - 27n^3 =$

a.  $(m-3n)(m^2 + 6mn + 9n^2)$

b.  $(m-3n)(m^2 - 6mn + 9n^2)$

c.  $(m+3n)(m^2 - 3mn + 9n^2)$

d.  $(m-3n)(m^2 + 3mn + 9n^2)$

e. None of these

26.  $49x^2 - 70xy + 25y^2$

a.  $(7x-5y)(7x+5y)$

b.  $(49x+25y)^2$

c.  $(7x-5y)^2$

d.  $(7x+5y)^2$

e. None of these

27. Solve for p:  $4p(2p+3) = 36$

28. The volume of a rectangular box is 120 cubic meters. The width of the box is 4 meters and the height is 1 meter less than the length. Find the length and height of the box.

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### Unit 4

29. List all numbers for which the rational expression is undefined.

$$\frac{x^2 - 4}{x^2 - 7x + 10}$$

30. Write the rational expression in lowest terms.

$$\frac{9x^2 - 4}{6x - 4}$$

- a.  $3x$       b.  $\frac{3x-2}{2}$       c.  $\frac{3x+2}{2}$       d.  $3x^2 - 1$       e. None of these

31. Multiply and simplify.

$$\frac{x^2 - 25}{2x + 6} \cdot \frac{x^2 + x - 6}{5 - x}$$

32. Divide and simplify.

$$\frac{x^2 - x - 20}{x^2 + 7x + 12} \div \frac{x^2 - 10x + 25}{x^2 + 6x + 9}$$

33. Find the Least Common Denominator (LCD) for the given fractions.

$$\frac{3}{x^2 + 5x}, \quad \frac{2}{x^2 + 10x + 25}, \quad \frac{-4}{x^3}$$

- a.  $x^3(x+5)^2$     b.  $(x^2+5)(x^2+10x+5)x^3$     c.  $x^3(x+5)$     d.  $x^3(x+5)^3$     e. None of these

34. Add and simplify.

$$\frac{5}{x-6} + \frac{3}{6-x}$$

35. Subtract and simplify.

$$\frac{10}{x^2 + x - 6} - \frac{3x}{x^2 - 4x + 4}$$

36. Simplify the complex fraction.

$$\frac{y - \frac{1}{y}}{\frac{1}{y} + 1}$$

## Answers to Mat 101 Review for Final Exam

1.  $x = -2$
2.  $x = 4/5$
3.  $b$
4.  $a$
5. \$15
6. \$7,000 @ 40% gain and \$8,000 @ 10% loss
7.  $(2, \infty)$
8.  $(7.5, \infty)$
9.  $d$
10. x-intercept:  $(3, 0)$     y-intercept:  $(0, -\frac{3}{2})$
11.  $7x^2 - 4x - 2$
12.  $10a^4 + 3a^3 - 18a^2 - 4a - 6$
13.  $16x^2 - 40xy + 25y^2$
14.  $5x^2 - 2x + 1 - \frac{2}{3x - 2}$
15.  $d. 4m^2 - 9$
16.  $b. -3x^2 + 2x + 1$
17.  $e. \frac{-1}{64}$
18.  $w^8 y^{20}$
19.  $\frac{5x^{25}}{4}$
20.  $\frac{a^4}{b^8}$
21.  $(5t - s^2)(2t^2 - s)$
22.  $2k^2(6k^3 - 3k + 5)$
23.  $b^3(7a - 3)(2a + 3)$
24.  $(9x^2 + 4)(3x - 2)(3x + 2)$
25.  $d. (m - 3n)(m^2 + 3mn + 9n^2)$
26.  $c. (7x - 5y)^2$
27.  $p = \frac{3}{2}, p = -3$
28. The length is 6 meters and the height is 5 meters.
29. 2 and 5
30.  $c. \frac{3x + 2}{2}$

**Answers to Mat 101 Review for Final Exam – continued**

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

32.  $\frac{x+3}{x-5}$

33. a.  $x^3(x+5)^2$

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

35.  $\frac{-3x^2+x-20}{(x-2)^2(x+3)}$

36.  $y-1$