

## Math 102 Review for Final Exam

### Unit 1

- Factor completely:  $26x - 12 + 10x^2$
- Divide and simplify:  $\frac{1-x^2}{x^3+x^2-2x} \div \frac{4x+4}{x^3+8}$
- Combine and simplify:  $\frac{1}{x-5} + \frac{3}{x^2-25} - \frac{2}{x^2+10x+25}$ 
  - $\frac{2}{(x-5)(x+5)^2}$
  - $\frac{x^2+15x+30}{(x-5)(x+5)^2}$
  - $\frac{x^2+11x+50}{(x-5)(x+5)^2}$
  - $\frac{x^2+9x}{(x-5)(x+5)^2}$
- Simplify  $\frac{\frac{1}{x+h} - \frac{1}{x}}{h}$
- Solve  $\frac{5}{x-1} + \frac{9}{x^2+x+1} = \frac{15}{x^3-1}$
- One car travels 18 km/h faster than another. In the same time that one travels 351 km, the other travels 468 km. Find the speed of the slower car.
  - 80 km/h
  - 72 km/h
  - 60 km/h
  - 54 km/h
- If 12 ounces is equal to 355 milliliters, then how many milliliters is 128 ounces equal to?
- Find the midpoint of the line segment with endpoints (5, -1) and (3, -6).
- Find an equation of a line that is perpendicular to the line passing through (-8, 2) and (1, 3) and has the same x-intercept. Put your answer in slope-intercept form.
- Write an equation in the form  $Ax + By = C$  of the line that passes through the point (-2, 3) and is parallel to  $7x - 2y = 14$ .

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### Unit 2

11. Find the union:  $2x - 2 \leq -8$  or  $x + 2 \geq -4$   
a.  $6 \leq x < -3$       b.  $-3 \leq x < 6$       c.  $-3 \leq x \leq -6$   
d.  $-6 < x \leq -3$       e. None of these
12. Solve:  $\left| \frac{1 + 3x}{5} \right| > \frac{7}{8}$
13. Solve:  $|-4x + 9| \leq 14$
14. One bar of tin alloy is 35 percent pure tin and another bar is 10 percent pure tin. How many pounds of each must be used to make 95 pounds of a new alloy that is 20 percent pure tin?
15. Solve: 
$$\begin{cases} 3x + 2y + z = 3 \\ 2x - y + 2z = 16 \\ x + y - z = -9 \end{cases}$$
16. Find  $g(-3)$  given that  $g(x) = 5x^2 - 2x + 3$ .  
a. 42      b. 54      c. 39      d. 27
17. A store sells 7 AC adaptors and 2 rechargeable flashlights for \$86, or 3 AC adaptors and 4 rechargeable flashlights for \$84. What is the price of a single AC adaptor and a single rechargeable flashlight?
18. Solve the system of equations: 
$$\begin{cases} x - 3y = 3 \\ 2x + y = -8 \end{cases}$$
19. A total of \$75,000 was invested in three parts; one part at 10%, the second part at 8% and the third part at 5%. The total interest earned from the three investments was \$5950. The amount invested at 8% was twice the amount invested at 10%. Find the amount invested at each rate.
20. Solve:  $|x + 2| = |x - 5|$

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### Unit 3

21. Simplify.  $\sqrt[3]{x^{15}}$
22. Simplify. Write your answer with positive exponents.  
$$\frac{(a^2b^5)^{-\frac{1}{2}}}{(a^{-1}b^3)^{\frac{1}{6}}}$$
23. Find the distance between the two points.  
 $(-3, 1)$  and  $(-4, -7)$
- a.  $\sqrt{113}$     b.  $5\sqrt{5}$     c.  $\sqrt{41}$     d.  $\sqrt{65}$
24. Express the radical in simplest form. Assume all variables represent positive real numbers.  
 $\sqrt{18x^3yz^4}$
25. Simplify.  
 $2\sqrt{8} - 4\sqrt{50} + \sqrt{27}$
26. Multiply and simplify.  
 $(\sqrt{3} - 1)(\sqrt{2} + 5)$
- a.  $\sqrt{6} - 5$     b.  $\sqrt{6} + 5\sqrt{3} - \sqrt{2} - 5$     c.  $\sqrt{6} + \sqrt{15} - \sqrt{2} - 5$     d.  $\sqrt{6} + 4\sqrt{3} - 5$
27. Rationalize the denominator.  
 $\sqrt[3]{\frac{2x^2}{y}}$
28. Rationalize the denominator.  
 $\frac{3}{\sqrt{5} - 1}$
29. Solve.  
 $\sqrt{4x + 5} - 7 = 0$
30. Multiply and simplify. Write your answer in standard form  $a + bi$ .  
 $(3 - 2i)(4 + 2i)$
- a.  $8 - 2i$     b.  $16 - 4i$     c.  $16 - 2i$     d.  $12 - 6i$

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### Unit 4

31. Solve  $3x^2 = 21$
32. Solve  $x^2 + 2x + 4 = 0$  by the method of completing the square.
33. Solve  $x^2 - 3x = 7$
34. Algebraically find the vertex for the graph of the function  $f(x) = 2x^2 + 4x + 5$   
a.  $(-1, 3)$     b.  $(-2, -3)$     c.  $(-1, 5)$     d.  $\left(-1, \frac{1}{2}\right)$     e. None of these
35. Find the maximum or minimum of the function  $f(x) = -3x^2 - 12x + 7$ .
36. Graph the function  $f(x) = 2x^2 - 4x - 5$ , including the axis of symmetry with its equation.
37. Solve  $x^2 - 2x \leq 15$
38. Solve  $x^{\frac{2}{3}} - 3x^{\frac{1}{3}} + 2 = 0$   
a.  $\{1, 2\}$     b.  $\{-1, -2\}$     c.  $\{1, \sqrt[3]{2}\}$     d.  $\{1, 8\}$     e. None of these
39. Solve  $p = \sqrt{\frac{kl}{g}}$  for  $g$
40. The height (in feet) of a projectile  $t$  sec after being fired from earth into the air is given by  $f(t) = -16t^2 + 160t$ . Find the number of seconds required for the projectile to reach maximum height. What is the maximum height?

## Answers to Mat 102 Review for Final Exam

1.  $2(5x-2)(x+3)$
2.  $\frac{-(x^2-2x+4)}{4x}$
3. c
4.  $\frac{-1}{x(x+h)}$
5.  $-\frac{19}{5}$
6. d
7.  $3786\frac{2}{3}$  mL
8.  $\left(4, -\frac{7}{2}\right)$
9.  $y = -9x - 234$
10.  $-7x + 2y = 20$
11. None of these
12.  $\left\{x \mid x < \frac{-43}{24} \text{ or } x > \frac{9}{8}\right\}$  or  $\left(-\infty, \frac{-43}{24}\right) \cup \left(\frac{9}{8}, \infty\right)$
13.  $\left\{x \mid \frac{-5}{4} \leq x \leq \frac{23}{4}\right\}$  or  $\left[\frac{-5}{4}, \frac{23}{4}\right]$
14. Will need 38 lbs. of the 35 percent alloy and 57 lbs. of the 10 percent alloy.
15.  $(0, -2, 7)$
16. 54
17. \$8 for one AC adaptor and \$15 for one rechargeable flashlight.
18.  $(-3, -2)$
19. Twenty thousand was invested at 10%, \$40,000 was invested at 8%, and \$15,000 was invested at 5%.
20.  $\frac{3}{2}$

## Answers to Mat 102 Review for Final Exam - Continued

21.  $x^5$

22.  $\frac{1}{a^{\frac{5}{6}} b^3}$

23. d.  $\sqrt{65}$

24.  $3xz^2\sqrt{2xy}$

25.  $-16\sqrt{2} + 3\sqrt{3}$

26. b.  $\sqrt{6} + 5\sqrt{3} - \sqrt{2} - 5$

27.  $\frac{\sqrt[3]{2x^2y^2}}{y}$

28.  $\frac{3\sqrt{5} + 3}{4}$

29. 11

30. c.  $16 - 2i$

31.  $x = \pm\sqrt{7}$

32.  $x = -1 \pm i\sqrt{3}$

33.  $x = \frac{3 \pm \sqrt{37}}{2}$

34. a.  $(-1, 3)$

35. The maximum value for the function is  $y = 19$  (which occurs when  $x = -2$ )

36. The parabola opens up from a vertex at  $(1, -7)$ . The axis of symmetry is a vertical line with equation  $x = 1$ . Other points on the graph of the parabola include  $(-1, 1), (0, -5), (2, -5), (3, 1)$

37.  $[-3, 5]$

38. d.  $\{1, 8\}$

39.  $g = \frac{kl}{p^2}$

40. It would take five seconds for the projectile to reach its maximum height of 400 feet.

**This review is designed to help students to prepare for the final examination. The final will contain questions not given here.**