ALGEBRA II                                          Name_____
Second Semester Exam Review

1. Simplify.

   a. $81^{\frac{3}{4}}$        b. $16^{-\frac{3}{2}}$        c. $\left(\sqrt[3]{-64}\right)^4$        d. $(-32)^{-\frac{3}{5}}$

2. Solve.

   a. $(2x-7)^{\frac{1}{2}}=5$        b. $(3x)^{-\frac{2}{3}}=16$

3. Simplify.

   a. $\sqrt[4]{256xy^4}$        b. $\sqrt{\dfrac{4x^2y}{9z^2}}$        c. $\sqrt[3]{54x^6y^{24}}$

4. If $f(x)=2x-1$ and $g(x)=x^2+x-4$, find:
   a. $f(-3)$        b. $g(4)$        c. $f(g(\frac{1}{2}))$

5. Find the inverse of:
   a. $f(x)=-3x+4$        b. $f(x)=\frac{1}{4}x-\frac{1}{4}$        c. $f(x)=\sqrt{2x}+3$

6. Solve.

   a. $6(x+3)^{\frac{3}{5}}=384$        b. $(2x+3)^{\frac{2}{3}}=4$        c. $\dfrac{2}{3}x^{\frac{1}{2}}=1$

7. Simplify.

   a. $\left(3e^{-3x}\right)^{-1}$        b. $\sqrt{4e^{2x}}$        c. $\dfrac{6e^{3x}}{4e}$

8. Simplify.

   a. $\log_7 343$        b. $\log_{25} 5$        c. $\log_{\frac{1}{4}} \dfrac{1}{4}$

9. Write as a single logarithm.
   a. $\ln 16 - \ln 4$        b. $3\ln x + \ln 5$        c. $4\log_{16} 12 - 4\log_{16} 2$

10. Expand each logarithm.

    a. $\log 9x$        b. $\ln \dfrac{3y^4}{x^3}$        c. $\log \sqrt[4]{x^3}$

11. Find the log to three decimal places.
    a. $\log_3 8$        b. $\log_5 10$        c. $\log_4 20$

12. Solve.
    a. $4\log_3 x = 28$        b. $\log(5-3x)=\log(4x-9)$        c. $\log_2 x = -1$

13. Solve.
    a. $10^{x-3}=100^{4x-5}$        b. $8^{5x}=16^{3x+4}$        c. $36^{x-9}=6^{2x}$

14. Suppose y varies directly as x.
    a. If $y=7$ when $x=2$, find y when $x=8$.        b. If $y=15$ when $x=9$, find x when $y=-5$.

15. Suppose z varies jointly as x and y. If z = 6 when x = 3 and y = 8, find z when x = -4 and y = 7.

16. Simplify.

   a. $\dfrac{5x^2 - 20}{25x^2} \div \dfrac{x^2 + 6x + 8}{x^2 + 10x + 24}$

   b. $(x+7) \div \dfrac{x^2 + 9x + 14}{x^2 + 5x + 6}$

   c. $(x^2 + x - 30) \div \dfrac{x^2 - 2x - 15}{x^2 + 7x + 12} \cdot \dfrac{x - 5}{x + 6}$

17. Simplify.

   a. $\dfrac{\dfrac{20}{x+1}}{\dfrac{1}{4} - \dfrac{7}{x+1}}$

   b. $\dfrac{\dfrac{6}{x-1} - 3}{\dfrac{3}{x}}$

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

18. Find the distance between the given points.
   a. (4, -3) and (6, 2)
   b. (-10, 12) and (-6, -14)
   c. (-5, 0) and (-2, -2)

19. Find the center of each circle.
   a. $x^2 + y^2 - 12x + 18y - 4 = 0$
   b. $3x^2 + 3y^2 + 3x + 3y - 1 = 0$
   c. $x^2 + y^2 - 2x + 6y + 9 = 0$

20. Find the equation of the parabola with vertex at the origin and the given focus or directrix.
   a. focus: (-2, 0)
   b. directrix: y = - 4
   c. directrix: $x = \frac{1}{4}$

21. Find the foci of each ellipse.
   a. $\dfrac{x^2}{81} + \dfrac{y^2}{4} = 1$
   b. $\dfrac{x^2}{121} + \dfrac{y^2}{100} = 1$
   c. $6x^2 + 3y^2 = 24$

22. Find the equation of the ellipse with the given foci and sum of focal radii.
   a. foci: $(0, \pm 2)$; 10
   b. foci: $(\pm \sqrt{77}, 0)$; 18
   c. foci: $(0, \pm \sqrt{21})$; 10

23. Find the equation of the hyperbola with the given foci and vertices.
   a. foci: $(\pm 3, 0)$; vertices: $(\pm 2, 0)$
   b. foci: $(0, \pm 6)$; vertices: $(0, \pm 1)$
   c. foci: $(\pm 5, 0)$; vertices: $(\pm 4, 0)$

24. Write an equation for the hyperbola with vertices at (0, -3) and (0, 3) and asymptotes y = 2x and y = -2x.

25. Which conic is represented by the equation?
   a. $x^2 + 36y^2 - 16x - 72y + 64 = 0$
   b. $x^2 + y^2 - 2x + 6y + 9 = 0$

   c. $x^2 + 6x - 2y + 13 = 0$
   d. $-x^2 + y^2 - 2x - 12y + 31 = 0$

26. What is the next term in the sequence?

   a. 4, 9, 16, 25, ...
   b. 4, 2, 0, ...
   c. $\dfrac{1}{2}, 1, \dfrac{3}{2}, 2, ...$

27. Find the indicated term for each sequence.

   a. $a_n = (n+1)^3; a_4$
   b. $a_n = (-1)^n; a_7$
   c. $a_n = \dfrac{n}{n+1}; a_5$

28. Determine whether each sequence is arithmetic, geometric, or neither?

   a. $5, \dfrac{5}{2}, \dfrac{5}{4}, \dfrac{5}{8}, \ldots$ 　　　　　b. -5, 5, 7, -7, . . .　　　　　c. 3, 6, 9, 12, . . .

29. Find the indicated sum of the arithmetic series.

   a. $S_{20}$: 40 + 37 + 34 + 31 + . . . 　　　　　b. $S_{28}$: -6 + (-2) + 2 + 6 + . . .

30. Find the indicated sum of the geometric series.

   a. $S_{10}$: 1 + 4 + 16 + 64 + . . . 　　　　　b. $S_{14}$: $-2 + 3 + \left(-\dfrac{9}{2}\right) + \dfrac{27}{4} + \ldots$

31. Find the common ratio for each infinite geometric series.

   a. $S = 16$; $a_1 = 12$ 　　　　　b. $S = \dfrac{3}{4}$; $a_1 = 1$ 　　　　　c. $S = -9$; $a_1 = -5$

32. Five books are taken from a shelf and laid in a stack on a table. In how many different orders can the books be stacked?

33. In how many ways can 4 marbles be selected from a box of 24 without replacement?

34. You have forgotten the combination to your locker. There are 40 numbers on the lock, and you are sure that all three of the numbers in your combination are different. How many possible locker combinations are there?