Place the letter of the correct answer in the space provided as well as on the answer sheet.

_____1. Perform the indicated operations and simplify: $7x - 3x[5 - (x - 2)]$

A) $28x - 4x^2$
B) $12x - 4x^2$
C) $-2x + 3x^2$
D) $-14x + 3x^2$

_____2. Factor completely, relative to the integers: $64x^3 - 27$

A) $(4x-3)(16x^2+12x+9)$
B) $(4x-3)(4x+3)$
C) $(4x-3)(16x^2-12x+9)$
D) $(4x-3)(16x^2-12x-9)$

_____3. Perform the indicated operations and simplify: $\dfrac{\dfrac{x}{y}+4}{\dfrac{x^2}{y^2}-16}$

A) $\dfrac{1}{x-4}$
B) $\dfrac{x+4y}{x^2-16y^2}$
C) $\dfrac{y}{x-4y}$
D) $\dfrac{y(x+4y)}{(x-16y)(x+16y)}$

_____4. Perform the indicated operations and simplify: $\dfrac{4x^2}{x^2-25} \div \dfrac{2x}{3x+15}$

A) $\dfrac{8x^3}{3(x+5)^2(x-5)}$
B) $\dfrac{6x}{x(x-5)}$
C) $\dfrac{3x}{x-5}$
D) $\dfrac{6x}{(x-5)}$

_____5. Simplify and write your answer using positive exponents only: $\left(\dfrac{5x^{-2}y^5}{10x^3y^2}\right)^{-2}$

A) $\dfrac{4x^{25}}{y^9}$
B) $\dfrac{4x^{10}}{y^6}$
C) $\dfrac{4x^2}{y^6}$
D) $\dfrac{y^6}{4x^{10}}$

_____6. Simplify: $\left(4x^{\frac{1}{2}}\right)\left(6x^{\frac{3}{4}}\right)$

A) $24x^{\frac{4}{6}}$
B) $24x^{\frac{3}{8}}$
C) $10x^{\frac{2}{3}}$
D) $24x^{\frac{5}{4}}$

_____7. Solve the equation for x: $\dfrac{4}{x+5}+\dfrac{3}{x-3}=\dfrac{31}{(x+5)(x-3)}$

A) $x = -5, x = 3$ B) $x = 4$ C) $x = \dfrac{31}{7}$ D) $x = \dfrac{29}{7}$

_____8. Solve the inequality and write the final answer using interval notation: $|3x-6| \geq 9$

A) $(-\infty,-1)\cup(5,\infty)$ B) $(-1, 5)$ C) $(-\infty,-1]\cup[5,\infty)$ D) $[-1, 5]$

_____9. Solve the inequality and write the final answer using interval notation: $-4 < -3x + 5 < 11$

A) $(-3, 2)$ B) $(-2, 3)$ C) $(3, -2)$ D) $\left(\dfrac{-16}{3},\dfrac{1}{3}\right)$

_____10. Solve the radical equation for x and check your answer: $\sqrt{x+11} = x-1$

A) $\{5\}$ B) $\{-2, 5\}$ C) $\{-5, 2\}$ D) $\{2\}$

_____11. Solve for x: $x^2 + 7x - 5 = 0$

A) $x = -7 \pm \dfrac{\sqrt{69}}{2}$ B) $x = \dfrac{-7 \pm \sqrt{29}}{2}$ C) $x = \dfrac{-7 \pm \sqrt{69}}{2}$ D) $x = -7 \pm \dfrac{\sqrt{29}}{2}$

_____12. Solve for x using the square root property: $25x^2 + 9 = 0$

A) $x = -\dfrac{3}{5}$ B) $x = \pm\dfrac{3}{5}i$ C) $x = \pm\dfrac{3}{5}$ D) $x = \pm\dfrac{5}{3}i$

_____13. Find an equation of the line with slope $m = -\dfrac{1}{3}$, that passes through the point (-2, 5)

A) $y = \dfrac{1}{3}x + \dfrac{13}{3}$ B) $y = -\dfrac{1}{3}x - \dfrac{13}{3}$ C) $y = -\dfrac{1}{3}x - \dfrac{17}{3}$ D) $y = -\dfrac{1}{3}x + \dfrac{13}{3}$

_____14. Find the domain of the function and write your answer in interval notation: $f(x) = \sqrt{6x - 24}$

A) $[4, \infty)$ B) $(-\infty, 4]$ C) $(4, \infty)$ D) $(-\infty, 4) \cup (4, \infty)$

_____15. Solve the inequality and write your final answer in interval notation: $\dfrac{x+4}{x-1} \le 0$

A) $(-\infty,-4] \cup (1,\infty)$ B) $(-\infty,-4] \cup [1,\infty)$ C) $[-4, 1)$ D) $[-4, 1]$

_____16. If $f(x) = 3x + 5$ and $g(x) = x^2 - 8$, find $(g \circ f)(x)$ and simplify.

A) $3x^3 + 5x^2 - 24x - 40$ B) $9x^2 + 30x + 17$ C) $9x^2 + 17$ D) $3x^2 - 19$

_____17. Determine the <u>vertex</u> of the parabola given by: $f(x) = 3x^2 + 36x + 76$

A) $(6, 2)$ B) $(-6, -2)$ C) $(6, -2)$ D) $(-6, 2)$

_____18. Given that x = 6 is a root of $P(x) = x^3 - 4x^2 - 20x + 48$, find the remaining roots.

A) x = -4, x = 2   B) x = -2, x = 4   C) x = -4, x = 12   D) x = -12, x = 4

_____19. Solve for x in the system of equations using any method: $\begin{array}{l} x + 2y = 15 \\ 2x - y = 5 \end{array}$

A) x = 4   B) x = 2   C) x = 5   D) x = 1

_____20. A rectangular family room is twice as long as it is wide, and its perimeter is 84 feet. Find the dimensions of the family room.

A) 18 ft x 36 ft   B) 16 ft x 32 ft   C) 12 ft x 24 ft   D) 14 ft x 28 ft

_____21. Find the value of x: $\dfrac{1}{2}\log_5 9 + \dfrac{3}{2}\log_5 4 - \log_5 6 = \log_5 x$

A) 4   B) 5   C) 6   D) 7

_____22. Simplify: $\dfrac{e^{2-3x}}{e^{x+1}}$

A) e^{1-4x} B) e^{1-2x} C) e^{3-4x} D) e^{3-2x}

_____23. Suppose you drive for 12.5 hours and you travel 786 miles. Which answer best describes your rate of travel?

    A) 65 mi/hr   B) 67 mi/hr   C) 63 mi/hr   D) 61 mi/hr

_____24. Suppose $12,000 is invested at 7% interest compounded monthly. How much money will be in the account at the end of 9 years?

    A) $5,475,310   B) $27,706   C) $547,531   D) $22,490

_____25. An urn contains 100 marbles. Fifty are purple, ten are green, fifteen are red, twenty-five are orange. Two marbles are drawn at random one after another without replacement. Calculate the following:

P(green and red)

A) $\dfrac{150}{9900}$ B) $\dfrac{150}{10000}$ C) $\dfrac{140}{9900}$ D) $\dfrac{140}{10000}$

Algebra II-Tie Breakers   Student Name: _____

1. How many liters of a 70% alcohol solution must be added to 50 liters of a 40% alcohol solution to produce a 50% alcohol solution?

Tie Breaker #2

For the function $f(x) = \sqrt{2x - 1}$ determine if an inverse function, $f^{-1}(x)$ exists. If the inverse exists,

    find the inverse:

    Show that the functions f(x) and f^{-1}(x) are inverse functions.

Tie Breaker #3

Consider the rational function, $\quad f(x) = \dfrac{x - 1}{x^2 - 2x - 3}$

    Find the following:

    1. Horizontal asymptote(s)

    2. Vertical asymptote(s)

    3. X- intercept(s)

    4. Y- intercept

1. D
2. A
3. C
4. D
5. B
6. D
7. B
8. C
9. B
10. A
11. C
12. B
13. D
14. A
15. C
16. B
17. B
18. A
19. C
20. D
21. A
22. A
23. C
24. D
25. A

Tie Breakers

1. 25 liters

2.

$$f^{-1} = \frac{x^2 + 1}{2}$$

$$fof^{-1} = \sqrt{2\left(\frac{x^2 + 1}{2}\right) - 1}$$

$$fof^{-1} = x$$

3.

Horizontal asymptote y = 0

Vertical asymptotes x = 3 and x - -1

X – intercept (1,0) or x = 1

Y – intercept (0,1/3) or y = 1/3