Math 98 **Sample Final Exam - Version A** Answers

To receive full credit, show all steps and present the exact value of solutions.

1. Find the average of $-\frac{2}{3}$, $3\frac{1}{6}$, 4, and $-\frac{1}{2}$ $\quad \frac{3}{2}$

2. Simplify each of the following expressions. Show all steps.

   (a) $(-1)^4 - 2 \cdot 3^2 \div (-2) \cdot 6 + (-3)^2 =$ $\quad 64$

   (b) $\left(3\frac{3}{5}\right) \div \left(1\frac{1}{3}\right) + \frac{3}{10} =$ $\quad 3$

   (c) $\left|-3^2 + 3 - \left|(-6)^2 + (-2)^3\right| - 2\right| + 1 =$ $\quad 37$

   (d) $(x+6)\left(x^2 - 6x + 36\right) =$ $\quad x^3 + 216$

   (e) $\dfrac{20 - 5x^2}{6x^2 + 3x^3} =$ $\quad -\dfrac{5(x-2)}{3x^2}$

   (f) $\dfrac{\left(x^2y^{-2}\right)^4 xy^{-1}(xy)^{-1}}{xy^0\left(x^{-2}y\right)^{-2}} =$ $\quad \dfrac{x^3}{y^8}$

   (g) $\dfrac{2x-5}{5-2x} =$ $\quad -1$

   (h) $\dfrac{a^2b^0a^{-2}\left(ab^{-1}\right)^3}{b^2a^0b^{-4}a^2} =$ $\quad \dfrac{a}{b}$

   (i) $\dfrac{\left(\frac{1}{2}\right)^{-1} + \left(\frac{1}{3}\right)^{-1}}{\left(\frac{1}{2}\right)^{-2} - \left(\frac{1}{3}\right)^{-2}} =$ $\quad -1$

   (j) $\dfrac{2^{-1} + 2^{-2}}{(-2)^{-1} + (-2)^{-2}} =$ $\quad -3$

3. Perform the indicated operations.

   (a) $\left(2x^3 - 4x^2 + \frac{1}{2}x - 5\right) - \left(-x^3 + 4x^2 + \frac{1}{2}x - 4\right) =$ $\quad 3x^3 - 8x^2 - 1$

   (b) $(p-1)\left(p + p^2 + p^3 + p^4 + 1\right) =$ $\quad p^5 - 1$

   (c) $(x-1)^2 - 2x(x-3) - (2x+1)^2 =$ $\quad -5x^2$

4. Factor completely each of the following expressions.

   (a) $2ax^2 - 18ay^2 - bx^2 + 9by^2 =$ $\quad (2a-b)(x+3y)(x-3y)$

   (b) $600ab^2 - 6ab^4 =$ $\quad -6ab^2(b-10)(b+10)$

   (c) $60st^2 - 44st^2x + 8st^2x^2 =$ $\quad 4st^2(x-3)(2x-5)$

   (d) $a^4 - 16 =$ $\quad (a-2)(a+2)(a^2+4)$

5. Solve each of the following equations. Make sure to check your solutions.

   (a) $15x^3 = 55x^2 + 20x$ $4, 0, -\frac{1}{3}$

   (b) $5(2x-3) - 3(4x-7) = -2x$ no solution

   (c) $7 - (2x-1)(x+5) = (3-x)(2x+7) - 17$ 1

   (d) $3x^3 = 75x$ $-5, 0, 5$

6. Solve each of the following inequalities. Make sure to check your solutions.

   (a) $\frac{2x+1}{3} - \frac{1-5x}{7} < 2x - 6$ $x > 10$

   (b) $-\frac{2}{3}x + \frac{3}{5} \leq -3\frac{2}{5}$ $x \geq 6$

7. Solve the system of linear equations. Make sure to check your solutions.

   (a) $\begin{cases} 2x - 3y = 13 \\ 3x + 2y = 13 \end{cases}$ $(5, -1)$

   (b) $\begin{cases} 2x - y = 3 \\ x = \frac{y}{2} + \frac{3}{2} \end{cases}$ dependent system

8. Find the slope of the line $3x - 5y = 12$. $\frac{3}{5}$

9. Graph the straight lines $2x - y = 7$ and $x + 2y = 6$ in the same coordinate system.

   (a) Use your graph to find the coordinates of the point where the lines intersect. $(4, 1)$

   (b) Use algebraic methods to check your answer for part a).

10. Word Problems.

    (a) One number is 3 less than twice the other. The sum of the two numbers is 42. Find these numbers. 15 and 27

    (b) One number is 3 less than twice the other. The product of the two numbers is 104. Find these numbers. $8, 13$ and $-\frac{13}{2}, -16$

    (c) Ann is four years younger than Tina. How old is Ann if the sum of their ages is 62? 29

    (d) The difference between two numbers is 7, their product is 228. Find these numbers. $12, 19$ and $-19, -12$

    (e) One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its perimeter is 48 in. 7 in by 17 in

(f) One side of a rectangle is 4 in shorter than 3 times the other side. Find the sides of the rectangle if its area is 319 in^2. 11 in by 29 in

(g) We have some ten-dollar bills and some twenty-dollar bills. All together, we have 47 bills, in the value of $ 620. How many twenty-dollar bills do we have? 15

(h) We have invested $ 3500 into two bank accounts. One account earns 7% interest per year, the other account earns 11% interest per year. How much did we invest in each account if the combined interest was 333? $ 2200 at 11% and $ 1300 at 7%