MATH 1010-2: PRACTICE FINAL[1]

December, 1010

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1. Solve for x:

$$7x - 2(x - 3) = 26.$$

1*. Solve for x:

$$\frac{x}{x-1} = 6.$$

1**. Solve for x:

$$-2(2 - x) - 3x = 16.$$

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2. Simplify

$$\frac{\frac{1}{5} - \frac{1}{6}}{\frac{2}{3}}$$

2*. Simplify

$$\frac{(2 - \frac{3^4}{9})}{\frac{1}{2}}$$

2**. Simplify

$$\frac{1}{1 - 7/5}.$$

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3. A hiker travels 3 miles east before turning and traveling due south to his destination. If he ends up 5 miles (as the crow flies) from his starting point, how far did he travel on the southbound leg of his hike?

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[1]There are more problems on this practice final than on the actual final exam. To get a feel for the length of the actual exam, you should choose one problem numbered 1, one problem numbered 2, and so on.

3*. The KSL tower is 80 meters tall. A 100 meter guy wire is stretched taut from the top of the tower to an anchor on the ground. How far is the anchor from the base of the tower?

3**. Find the distance between $(-1, -2)$ and $(3, -5)$.

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4. Find the equation of the line which passes through $(1, -2)$ and which is parallel to the line $2x + y = 3$. Write your answer in slope-intercept form, and sketch its graph.

4*. Find the equation of the line which passes through $(0, 2)$ and which is perpendicular to the line $2y = 1 - x$. Write your answer in slope-intercept form, and sketch its graph.

4**. Find the equation of the line which passes through $(2, -3)$ and which has the same slope as the line passing through $(2, 3)$ and $(4, -5)$. Write your answer in slope-intercept form, and sketch its graph.

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5. Perform the indicated operations and simplify:

$$(x + 1)^2 - (x + 2)^2 + 3.$$

Write your answer as a polynomial in standard form. What is the degree and leading coefficient?

5*. Perform the indicated operations and simplify:

$$(x - 1)(x^2 - 2x + 3) - (x + 2).$$

Write your answer as a polynomial in standard form. What is the degree and leading coefficient?

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6. Perform the indicated operations and simplify:

$$\frac{x^2 - 4x - 5}{x^2 - 1} \cdot \frac{x^2 + 3x + 2}{x^2 + 10x + 25}.$$

6*. Perform the indicated operations and simplify:

$$\frac{x}{x - 3} + \frac{1}{x - 4} - \frac{x}{x + 4}$$

7. Rewrite using rational exponents and simplify so that no fractional exponents or radicals appear in your final answer:

$$\frac{\sqrt[4]{16x^6}}{\sqrt{x^3}}.$$

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8. Simplify so that no fractional exponents (or radicals) appear in your final answer:

$$\frac{x^{2/3}}{x^{-1/3}} \cdot (x^6)^{1/3}.$$

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9. Solve by any method you choose:

$$x^2 + 11x + 28 = 0.$$

9*. Solve by any method you choose:

$$x^2 + x - 7 = 0.$$

9**. Solve by any method you choose:

$$x^2 + 2x = 9.$$

9***. Solve by any method you choose:

$$-x^2 + 2x = 2(x^2 - x) - 5.$$

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10. Solve for x:

$$2 - \sqrt{x - 3} = 0.$$

10*. Solve for x:

$$\sqrt{8 - 2x} = x.$$

10**. Solve for x:

$$\sqrt{x - 1} = 1 + \sqrt{x - 7}.$$

11. Eighty percent of a number equals half the number plus 10. What is the number?

11* A small rectangular garden plot is 800 square feet in area. If the length of the plot is twice its width, what is the width of the plot?

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12. Solve the following system of equations by any method you wish:

$$x - 2y = 13$$
$$2x - y = 11.$$

12*. Solve the following system of equations by any method you wish:

$$x - 2y + 3z = 22$$
$$5y + 3z = 26.$$
$$3y - 2z = -11.$$

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13. Simplify as much as possible:

$$\sqrt[5]{64x^5y^6}.$$

13*. Simplify as much as possible:

$$\sqrt[3]{\frac{16z^3}{y^6}}.$$

13**. Simplify as much as possible:

$$\sqrt{4e^{6x}y^3}.$$

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14. Solve for x:

$$\frac{500}{3x+5} = \frac{50}{x-3}.$$

14*. Solve for x:

$$x - \frac{24}{x} = 5.$$

14**. Find all solutions of:

$$\frac{1}{y+2} - \frac{1}{y+4} = \frac{2}{15}$$

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15. Find the domain of

$$f(x) = \frac{1}{(x-2)(x+3)}$$

15*. Find the domain of

$$f(x) = \frac{1}{x^2 - 8x + 15}$$

15**. Find the domain of

$$f(x) = \log_{10}(5x - 7).$$

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16. You and your neighbor can build a 20 foot section of fence in 6 hours. Working on your own, it would take you 14 hours. How long would it take your neighbor if he were to work on his own?

16*. There are two kinds of tickets sold to the Ballet West production of the Nutcracker. Adult tickets cost \$21 and kids tickets cost \$8. If there are twice as many children in the sold out 2400-seat theatre, how much money did the box office collect?

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17. If $f(x) = x^2 + 2x + 1$ and $g(x) = x - 1$, compute $(f \circ g)(x)$.

17*. If $f(x) = \log_3(3x - 1)$ and $g(x) = 3^x + \frac{1}{3}$, compute $(f \circ g)(x)$.

17**. If $f(x) = x^2 + 2$ compute $(f \circ f)(x)$.

18. Given that $\log_a(x) = 0.5$ and $\log_a(y) = 0.25$, compute $\log_a(x^2y^3)$.

18*. Using the property of logs, simplify $\log_5(50) - \log_5(10)$.

18**. Using properties of logs, condense the following expression: $\log_3(2) + \frac{1}{2}\log_3(y)$.

19. Sketch the graph of $f(x) = 2^x + 3$. Clearly label any x- and y-intecepts.

19*. Sketch the graph of $g(x) = x^2 - 3x - 4$. Clearly label any x- and y-intercepts.

20. A \$1000 investment is made is a trust fund with an annual interest rate of 10% compounded continuously. After t years, the value of the fund is

$$P(t) = 1000e^{t/10}$$

How long will it take the investment to double in value? You may leave logarithms and exponentials in your answer.

20*. A radioactive element has a half life of 1000 years. Fifty pounds of the element were buried in the West Desert in 2010. How much of the substance will remain in the year 5010?