

REVIEW FOR MATH D FINAL

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writing in this booklet*

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Before Taking the Final Exam!

BOOK # _____

FORMULA SHEET: MATH D

Quadratic Formula

$$y = ax^2 + bx + c$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Parabolas

$$f(x) = ax^2 + bx + c$$

$$\text{vertex} = \left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right) \right)$$

Rational Exponents

$$\sqrt[n]{a^m} = \left(\sqrt[n]{a}\right)^m = a^{\frac{m}{n}}$$

Properties of Logarithms

$$\log x + \log y = \log(xy)$$

$$\log x - \log y = \log\left(\frac{x}{y}\right)$$

$$\log x^a = a \log x$$

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Review for Math D Final Exam

Part 1

This review covers material which will be on the first half of the final exam.
This is only the first half of the Review! Please see Part 2 for other topics covered.

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Show all work for each problem on separate paper.

Solve the equation.

1) $\frac{3x-3}{9} = \frac{x-5}{3} - \frac{x+8}{9}$

2) $-6(x-2) + 52 = 2x - 8(x-9)$

Simplify the exponential expression.

3) $(5x^{-6}y^9z^{-8})^{-4}$

4) $\left(\frac{9x^{-3}y^{-2}z^4}{3xy^{-2}z^{-4}}\right)^{-3}$

Perform the indicated computation. Write the answer in scientific notation.

5) $(4 \times 10^{-4})(6.7 \times 10^{-9})$

6) $\frac{22.2 \times 10^8}{5 \times 10^6}$

Graph the linear function.

7) $-x + 4y = 24$

8) $7x - 6y = 42$

Use the given conditions to write an equation for the line in slope-intercept form.

9) Passing through (2, 3) and perpendicular to the line whose equation is $y = \frac{1}{8}x + 7$.

10) Passing through (2, 5) and parallel to the line whose equation is $y = -\frac{1}{9}x + 8$.

Solve the compound inequality and graph the solution set on a number line. Except for the empty set, express the solution set in interval notation.

11) $-4x \leq -12$ or $3x > 9x - 6$

12) $19 \leq 5x + 4 \leq 29$

Solve the equation.

13) $|6x - 4| = |x - 7|$

14) $|2x + 6| + 3 = 7$

Solve and graph the solution set on a number line.

15) $|2x + 3| - 7 < -3$

16) $|3(x + 1) + 6| \geq 9$

Graph the solution set of the system of inequalities.

17)
$$\begin{cases} 3x - y \leq 9 \\ x + 2y \geq -4 \end{cases}$$

18)
$$\begin{cases} y \leq 2x + 1 \\ y > \frac{2}{3}x \end{cases}$$

Factor completely, or state that the polynomial is prime.

19) $x^3 + 2x^2 - 9x - 18$

20) $2x^3 + 7x + 4x^2 + 14$

21) $216x + x^4$

22) $64x^3y^3 - x^6y^6$

Solve the problem.

- 23) An object is thrown upward from the top of a 160-foot building with an initial velocity of 48 feet per second. The height h of the object after t seconds is given by the quadratic equation $h = -16t^2 + 48t + 160$. When will the object hit the ground?
- 24) If the cost, $C(x)$, for manufacturing x units of a certain product is given by $C(x) = x^2 - 40x + 9600$, find the number of units manufactured at a cost of \$14,100.

Simplify.

$$25) \frac{\frac{2}{x} - \frac{5}{x+4}}{\frac{4}{x^2+4x}}$$

$$26) \frac{\frac{7}{3r-1} - 7}{\frac{7}{3r-1} + 7}$$

Solve the problem.

- 27) A car travels 400 miles on level terrain in the same amount of time it travels 160 miles on mountainous terrain. If the rate of the car is 30 miles per hour less in the mountains than on level ground, find its rate in the mountains.
- 28) A boat moves 10 kilometers upstream in the same amount of time it moves 16 kilometers downstream. If the rate of the current is 5 kilometers per hour, find the rate of the boat in still water.

Perform the indicated operations. Simplify where possible.

$$29) \frac{x^2 + 5x + 6}{x^2 + 10x + 21} \div \frac{x^2 + 2x}{x^2 + 4x - 21}$$

$$30) \frac{x^3 + 1}{x^3 - x^2 + x} \cdot \frac{4x}{-40x - 40}$$

Perform the indicated operations. Simplify where possible.

$$31) \frac{x+4}{x^2+6x+5} + \frac{5x+3}{x^2+4x+3}$$

$$32) \frac{5x}{x+1} + \frac{6}{x-1} - \frac{10}{x^2-1}$$

Divide.

$$33) (9x^3 + 21x^2 + 19x + 23) \div (-3x - 2)$$

$$34) (-2x^3 - 1x^2 + 17x + 6) \div (x + 3)$$

Solve the rational equation.

$$35) 1 + \frac{1}{x-4} = \frac{18}{x^2-16}$$

$$36) \frac{1}{y+5} - \frac{5}{y-5} = \frac{14}{y^2-25}$$

Solve the equation for the specified variable.

$$37) \frac{1}{a} + \frac{1}{b} = \frac{1}{c} \text{ for } c$$

$$38) P = \frac{A}{1+rt} \text{ for } r$$

Solve the system of equations.

$$39) \begin{cases} 5x + 5y + z = -29 \\ 2x - 3y - z = 4 \\ x + y + z = -9 \end{cases}$$

$$40) \begin{cases} x + y + z = -8 \\ x - y + 2z = -4 \\ 2x + y + z = -11 \end{cases}$$

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Answer Key for Part 1

1) $x = -20$

2) \emptyset ; inconsistent equation

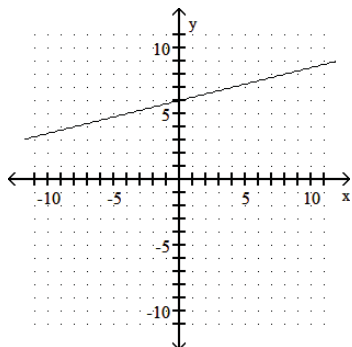
3) $\frac{x^{24}z^{32}}{625y^{36}}$

4) $\frac{x^{12}}{27z^{24}}$

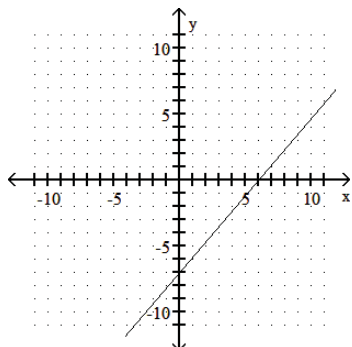
5) 2.68×10^{-12}

6) 4.44×10^2

7)



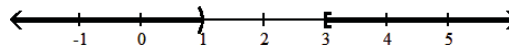
8)



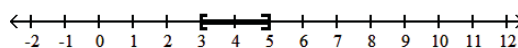
9) $y = -8x + 19$

10) $y = -\frac{1}{9}x + \frac{47}{9}$

11) $(-\infty, 1) \cup [3, \infty)$



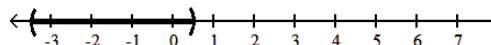
12) $[3, 5]$



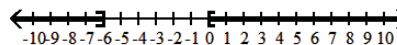
13) $x = -\frac{3}{5}, x = \frac{11}{7}$

14) $x = -1, x = -5$

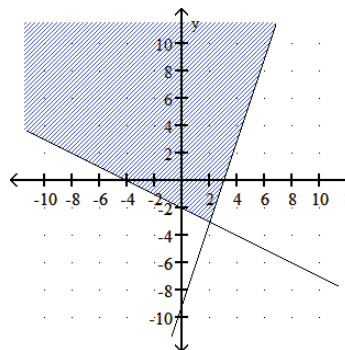
15) $\left[-\frac{7}{2}, \frac{1}{2}\right)$



16) $(-\infty, -6] \cup [0, \infty)$



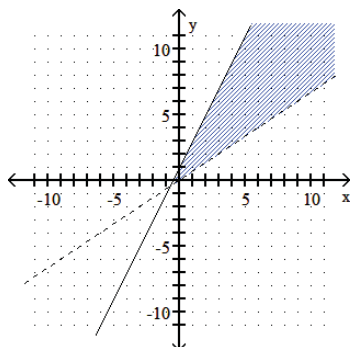
17)



Review for Math D Final Exam

Answer Key for Part 1

18)



19) $(x + 2)(x + 3)(x - 3)$

20) $(x + 2)(2x^2 + 7)$

21) $x(6 + x)(36 - 6x + x^2)$

22) $x^3y^3(4 - xy)(16 + 4xy + x^2y^2)$

23) 5 sec

24) 90 units

25) $\frac{-3x+8}{4}$

26) $\frac{2 - 3r}{3r}$

27) 20 mph

28) $21\frac{2}{3}$ kilometers per hour

29) $\frac{x - 3}{x}$

30) $-\frac{1}{10}$

31) $\frac{6x^2 + 35x + 27}{(x + 1)(x + 5)(x + 3)}$

32) $\frac{5x - 4}{x - 1}$

33) $-3x^2 - 5x - 3 + \frac{17}{-3x - 2}$

34) $-2x^2 + 5x + 2$

35) $x = -6, x = 5$

36) $x = -11$

37) $c = \frac{ab}{a + b}$

38) $r = \frac{A - P}{Pt}$

39) $(-3, -2, -4)$

40) $(-3, -3, -2)$

Review for Math D Final Exam

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Use properties of rational exponents to simplify the expression. Express the answer as a radical expression.

1) $z^{-2/5} \cdot z^{3/5}$

2) $\frac{x^{1/3}}{x^{4/5}}$

Perform the indicated operation and, if possible, simplify. Assume that all variables represent positive real numbers.

3) $(3 - \sqrt{x})(6 - \sqrt{x})$

4) $(6\sqrt{5} + 7)^2$

Solve the equation.

5) $x - 9 = \sqrt{5x - 9}$

6) $\sqrt{x^2 - 5x + 36} = x + 1$

Perform the indicated operation.

7) $\frac{8 + 5i}{3 - 4i}$

8) $\frac{6 - 4i}{4 + 2i}$

Solve the equation.

9) $4x^2 = -10x - 1$

10) $x^2 - 8x + 41 = 0$

Solve the rational inequality and graph the solution set on a real number line.

11) $\frac{-x - 5}{x + 9} \leq 0$

12) $\frac{8x + 9}{4 - 2x} \geq 0$

Graph the quadratic function and give the vertex and intercepts.

13) $f(x) = 6 + 5x + x^2$

14) $f(x) = 3 - x^2 - 2x$

Find the composition.

15) If $f(x) = x^2 + 6x$ and $g(x) = x + 2$, find $(f \circ g)(2)$.

16) If $f(x) = \frac{x - 6}{3}$ and $g(x) = 3x + 6$, find $(g \circ f)(x)$.

Find the inverse of the one-to-one function.

17) $f(x) = x^3 + 12$

18) If $f(x) = -3x + 8$

Expand the logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$19) \log \left(\frac{\sqrt[3]{x}}{100} \right)$$

$$20) \log_4 \left(\frac{xy^5}{z^4} \right)$$

Solve the equation.

$$21) 4^{(5-3x)} = \frac{1}{256}$$

$$22) 4^{(3x-1)} = 1024$$

$$23) e^{(x+7)} = 4$$

$$24) 3e^{(x+2)} = 21$$

$$25) \log_3(x-7) = 4$$

$$26) \log_3(x^2 - 2x) = 1$$

$$27) \log_{11} x + \log_{11}(10x-1) = 1$$

$$28) \log_6(x+2) - \log_6 x = 2$$

Solve the system of equations.

$$29) \begin{cases} x^2 + y^2 = 25 \\ x + y = 7 \end{cases}$$

$$30) \begin{cases} x + y = 23 \\ y = x^2 - 6x + 9 \end{cases}$$

Rationalize the denominator and simplify.

31) $\frac{xy\sqrt[3]{3}}{\sqrt[3]{xy^2}}$

32) $\frac{18}{\sqrt[3]{9x^2}}$

Use the compound interest formulas $A = P\left(1 + \frac{r}{n}\right)^{nt}$ and $A = Pe^{rt}$ to solve.

33) Suppose that you have \$5000 to invest. Which investment yields the greater return over 8 years: 6.25% compounded continuously or 6.3% compounded semiannually?

34) Find the accumulated value of an investment of \$3000 at 5% compounded continuously for 3 years.

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Answer Key for Part 2

1) $\sqrt[5]{z}$

2) $\frac{1}{\sqrt[15]{x^7}}$

3) $18 - 9\sqrt{x} + x$

4) $229 + 84\sqrt{5}$

5) $x = 18$

6) $x = 5$

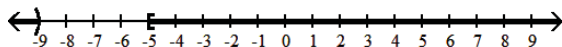
7) $\frac{4}{25} + \frac{47i}{25}$

8) $\frac{4}{5} - \frac{7i}{5}$

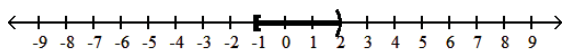
9) $x = \frac{-5 \pm \sqrt{21}}{4}$

10) $x = 4 \pm 5i$

11) $(-\infty, -9) \cup [-5, \infty)$



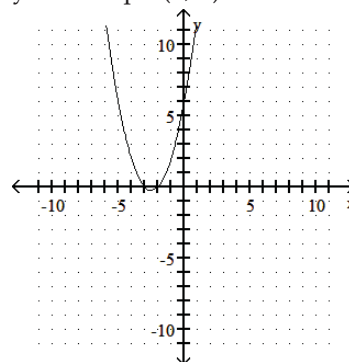
12) $\left[-\frac{9}{8}, 2\right)$



13) vertex: $\left(-\frac{5}{2}, -\frac{1}{4}\right)$

x-intercepts: $(-3, 0)$ and $(-2, 0)$

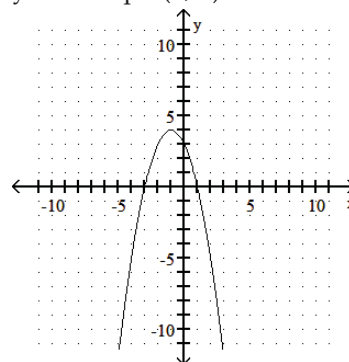
y-intercept: $(0, 6)$



14) vertex: $(-1, 4)$

x-intercepts: $(-3, 0)$ and $(1, 0)$

y-intercept: $(0, 3)$



15) 40

16) x

17) $f^{-1}(x) = \sqrt[3]{x - 12}$

18) $f^{-1}(x) = \frac{x - 8}{-3}$

19) $\frac{1}{3} \log x - 2$

Review for Math D Final Exam Answer Key for Part 2

- 20) $\log_4 x + 5 \log_4 y - 4 \log_4 z$
- 21) $x = 3$
- 22) $x = 2$
- 23) $x = \ln 4 - 7$
- 24) $x = \ln 7 - 2$
- 25) $x = 88$
- 26) $x = 3, x = -1$
- 27) $x = \frac{11}{10}$
- 28) $x = \frac{2}{35}$
- 29) $(4, 3), (3, 4)$
- 30) $(7, 16), (-2, 25)$
- 31) $\sqrt[3]{3x^2y}$
- 32) $\frac{6\sqrt[3]{3x}}{x}$
- 33) \$5000 invested at 6.25% compounded continuously over 8 years yields the greater return.
- 34) \$3485.50

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