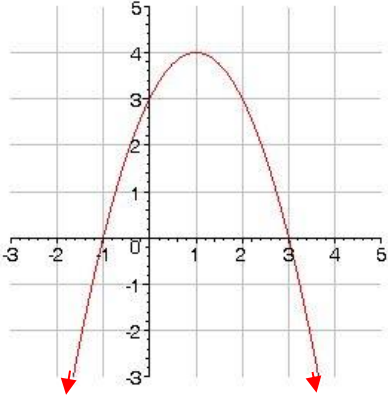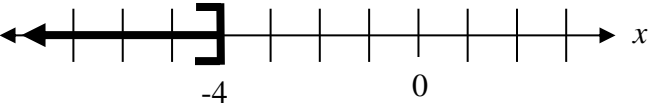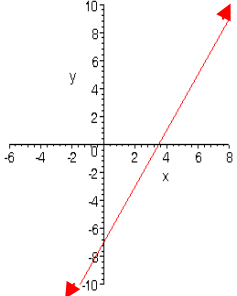# Queensborough Community College
The City University of New York

MA-119 Review for Final Exam: Spring 2013

1. Simplify completely and express in terms of positive exponents: $\left(\dfrac{a^{-2}b^{5}}{c^{-11}}\right)^{-6}$

2. Find the slope-intercept form of the equation of the line that is perpendicular to $3x+2y=12$ and passes through the point (–6, –2).

3. Find the slope-intercept form of the equation of the line through the points (–2, 5) and (1, –4).

4. Solve for x: $2\,|x-1| + 20 = 25$

5. Factor completely: $6ax - 6bx - 2ay + 2by$

6. Based on the graph on the right,
   a) For what values of x is y positive?
      Express your answer in interval notation.
   b) Find the domain of the function.
   c) Find the range of the function.
   d) Determine the value of $f(2)$.
   e) Determine the coordinates of the x-intercepts.
   f) Determine the coordinates of the y-intercept.

7. Solve for x and express your answer in interval notation, set builder notation, and graph:
   $2x-7 \geq 5x+5$

8. Factor completely: $3x^{3} - 24$

9. Solve for x and check: $\dfrac{7}{x+3} + \dfrac{2}{x^{2}-9} = -\dfrac{1}{x-3}$

10. Find the domain of: $f(x) = \sqrt{3-2x}$.

11. Calculate: $(-8)^{\frac{4}{3}}$

12. Assuming that x and y are positive, express in radical form and simplify: $(-27x^{3}y^{2})^{\frac{1}{3}}$

13. Solve and check: $\sqrt{13-x} + 1 = 5$

14. Simplify and express in $a+bi$ form: $(5-6i)^{2}$

15. Solve using the Square Root Property and express the solution in $a+bi$ form: $(x-8)^{2} = -25$

16. A painting measuring 12 inches by 18 inches is surrounded by a frame of uniform width. If the combined area of the painting and the frame is 432 square inches, determine the width of the frame.

17. The sum of a positive number and twice its square is 6.72. Find the number.

18. $10,000 is invested at 4% interest compounded semiannually. Using the formula:
   $A = P\left(1+\dfrac{r}{n}\right)^{nt}$, determine how much the investment is worth after 5 years.

19. Solve for x: $\log_{8} x = \dfrac{1}{3}$

20. Solve for x to the nearest thousandth: $2^{x} = 47$

21. Solve for x: $\log(x+9) - \log x = 2$

22. If $f(x) = x^{2} - 3x + 2$, determine $f(0)$, $f(-5)$, and $f(2a)$.

23. Find the domain of: $f(x) = \dfrac{1}{4x+5}$.

24. Solve the system of equations
$$\begin{array}{rcl} 5x - 3y &=& 19 \\ -3x + 2y &=& -12 \end{array}$$

25. Solve for x and write the solution using interval notation. $\quad -5 \le 2x - 3 < 8$

26. a) Find the point-slope form of the equation of the line parallel to $4x - 2y = 8$ that passes through the
    point (2, –3).
   b) Find the slope-intercept form of the equation.
   c) Graph the resulting equation. Label the axes and indicate an appropriate scale.
   d) From your graph, determine the coordinates of the x-intercept.

27. Solve $\dfrac{1}{p} = \dfrac{1}{q} + \dfrac{1}{r}$ for r.

28. Factor completely: $8x^3 + 27y^6$

29. Simplify: $\dfrac{\dfrac{1}{x} - \dfrac{1}{y}}{\dfrac{y^2 - x^2}{x}}$

30. If $f(x) = \sqrt[3]{1 - 2x}$, evaluate $f(0)$ and $f(-13)$.

31. Rationalize the denominator and simplify: $\dfrac{4}{2\sqrt{x} - 1}$

32. Assuming that x and y are positive, simplify: $\sqrt{32x^5 y^6}$

33. Simplify and express results in radical form: $3\sqrt{8} - 5\sqrt{2} - \sqrt{50}$

34. Solve and check: $\sqrt[3]{10 - 2x} = -2$

35. Calculate and write the quotient $\dfrac{2i}{3 - 2i}$ in $a + bi$ form.

36. Solve by Completing the Square: $x^2 + 8x - 1 = 0$

37. The hypotenuse of a right triangle is 8 feet long. One leg is 3 feet shorter than the other. Find the
length of each leg to the nearest hundredth of a foot.

38. For the function $y = -x^2 + 3x + 10$,
    a) Determine the **coordinates** of the x-intercepts (if any).
    b) Find the **coordinates** of the y-intercept.
    c) Find the **equation** of the axis of symmetry.
    d) Determine the **coordinates** of the vertex.
    e) Graph the function, and label and indicate an appropriate scale on the axes.

39. A car is depreciating according to the formula: $V = 30000(2.72)^{-.08x}$ where x is the age of the car
in years. Find the value of the car when it is five and one-half years old.

40. Solve for x: $\quad \log_3 x + \log_3 (x + 2) = 1$

41. Using the formula: $A = P\left(1 + \dfrac{r}{n}\right)^{nt}$, determine how many years, to the nearest hundredth, it will take

to double your money if you invest \$10,000 at $6\frac{1}{2}\%$ interest compounded quarterly.

42. Subtract and simplify: $\dfrac{8x - 7}{x^2 - 5x - 6} - \dfrac{2}{x + 1}$

43. Divide and simplify: $\dfrac{x^2 + 2x - 15}{4x - 8} \div \dfrac{x^2 - 25}{2x + 4}$

44. Perform the operations and simplify: $\dfrac{x^2 + x - 6}{x^2 + 3x - 4} \div \dfrac{x^2 + 3x - 10}{3x - 3} - \dfrac{2}{x + 5}$

Answers

1. $\dfrac{a^{12}}{b^{30}c^{66}}$	2. $y=\dfrac{2}{3}x+2$	3. $y=-3x-1$	4. $x=\dfrac{7}{2}$ and $x=-\dfrac{3}{2}$	5. $2(a-b)(3x-y)$

6. a) $(-1,3)$, b) $(-\infty,\infty)$, c) $(-\infty,4]$, d) 3, e) $(-1,0)$ and $(3,0)$, f) $(0,3)$

7. $x\le-4$, $(-\infty,-4\,]$, $\{x\,|\,x\le-4\}$,

8. $3(x-2)(x^2+2x+4)$	9. $x=2$	10. Domain $=\left\{x\,\middle|\,x\le\dfrac{3}{2}\right\}$	11. 16	12. $-3x\sqrt[3]{y^2}$

13. $x=-3$	14. $-11-60\,i$	15. $x=8\pm5i$	16. 3 inches 17. 1.6

18. $A=\$12,\!189.94$	19. $x=2$	20. $x=5.555$ 21. $x=\dfrac{1}{11}$

22. $f(0)=2,\ f(-5)=42,\ f(2a)=4a^2-6a+2$ 24. $(x,y)=(2,-3)$ 25. $\left[-1,\dfrac{11}{2}\right)$

23. Domain $=\left\{x\,\middle|\,x \text{ is a real number and } x\neq-\dfrac{5}{4}\right\}$ 27. $r=\dfrac{pq}{q-p}$ 31. $\dfrac{8\sqrt{x}+4}{4x-1}$

26. a) $y+3=2(x-2)$
    b) $y=2x-7$
    c) see graph
    d) $\left(\dfrac{7}{2},0\right)$

28. $(2x+3y^2)(4x^2-6xy^2+9y^4)$

29. $\dfrac{1}{y(y+x)}$ or $\dfrac{1}{y^2+yx}$

30. $f(0)=1,\ \ f(-13)=3$

32. $4x^2y^3\sqrt{2x}$ 33. $-4\sqrt{2}$

38. a) $(-2,0)$ and $(5,0)$
    b) $(0,10)$
    c) $x=\dfrac{3}{2}$
    d) $\left(\dfrac{3}{2},\dfrac{49}{4}\right)$
    e) see graph

34. $x=9$ 35. $-\dfrac{4}{13}+\dfrac{6}{13}i$

36. $x=-4\pm\sqrt{17}$ 39. $\$19,\!315.72$

37. 6.95 feet and 3.95 feet

40. $x=1$ 41. 10.75 years

42. $\dfrac{6x+5}{(x-6)(x+1)}$	43. $\dfrac{(x+2)(x-3)}{2(x-2)(x-5)}$	44. $\dfrac{x+1}{(x+4)(x+5)}$