BRONX COMMUNITY COLLEGE
of the City University of New York

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MATH 06 — Third Exam
Spring 2015 — Due date: 11/11/2015

1. (12 points) Simplify the following expressions:
   (a) $5\sqrt{12} - 7\sqrt{27} + 2\sqrt{3}$
   (b) $(3 - \sqrt{2})^2$
   (c) $32^{-3/5}$
   (d) $\left(\frac{8x^7y^{10}}{xy}\right)^{-1/3}$
   (e) $(-3 + 5i)(1 + 2i)$
   (f) $\frac{1+3i}{2-3i}$

2. (16 points) Simplify:
   (a) $\frac{x^2-1}{x^2+2x+1} \div \frac{x-1}{2x^2-x-3}$ $\quad$ (a') $\frac{3x+7}{x+5} + \frac{2x+18}{x+5}$
   (b) $\frac{a-b}{5} - \frac{31-4b}{4}$ $\quad$ (b') $\frac{3x}{x+5} - \frac{5x}{x-3}$
   (c) $\frac{3x-7}{x^2-4} + \frac{2x-18}{x^2-3x+2}$ $\quad$ (c') $\frac{4x^2-25}{x^2+x-12} \cdot \frac{2x^2-6x}{4x^2-10x}$
   (d) $\frac{\frac{3}{x-4}-2}{1-\frac{4}{x-4}}$ $\quad$ (d') $\frac{\frac{1}{x-1}+1}{\frac{1}{x-1}-1}$

3. (8 points) Given the quadratic function $f(x) = 3x^2 - 6x - 1$.
   (a) Find the y-intercept.
   (b) Find the x-intercepts (in case of radicals use an approximate value for the graph).
   (c) Find the vertex.
   (d) Sketch the graph.

4. (5 points) Solve the equation: $\dfrac{5}{3x-2} = \dfrac{3}{2x+4}$.

5. (5 points) Solve the quadratic equation: $3x^2 - 7x = 3$ using any method.

6. (5 points) Solve the quadratic equation $x^2 - 10x = 20$ using completion of squares.

7. (5 points) Solve and check: $\sqrt{8-x} = x + 4$.

8. (5 points) Solve the equation $3^{2x-1} = 1/81$.

9. (10 points) Given the functions $f(x) = 2^x$ and $g(x) = \log_2(x)$:

(a) Complete the table:

x	f(x)	x	g(x)
-3		1/8	
-2		1/4	
-1		1/2	
0		1	
1		2	
2		4	
3		8	

(b) Sketch the graph of f and g in the same axis of coordinates.

10. (8 points) Compute the x in each case by changing to exponential form or by applying properties of logarithms:
a) $\log_2(x) = 5$, $b) \log_x(3) = 2$ $c) \log_8(4) = x$ $d) \log_{27}(1/9) = x$

11. (8 points) Approximate the value of x with 5 decimal places:
    (a) $x = \log_2(6)$
    (b) $4x = \log_3(2)$
    (c) $2x - 1 = \log_5(7)$
    (d) $7(5^x) + 2 = 16$

12. (5 points) The height of a building is 77 meters and the angle from a point in the ground to the top of the building is $38°$. What is the distance from the point in the ground to the top?

13. (5 points) A right angle is such that one of the legs is 3 inches and the opposite angle is $25°$. What are the lengths of the other two sides?

14. (5 points) If an anle θ in the third quadrant has $\sin(\theta) = -3/5$. Find the value of $\cos(\theta)$ and $\tan(\theta)$.