Math 3C Fall 2013 – Exam 1 version A

Instructions: Put your name, PID, section number, and TA's name, on your blue book. Also, write which version of the test on the front of your blue book (this is Version A). No calculators or electronic devices are allowed. Turn off and put away your cell phone. You may use one page of handwritten notes, but no other notes, books, or resources. Make sure your solutions are clear and legible, and show all your work. Credit may not be given for unreadable or unsupported answers. Write your solutions in your blue book, keeping the questions in order, and clearly indicating which problem is on which page.

Question 0: (1 point) Read the instructions above and make sure you have followed them all, as well as any instructions given by the professor during the test.

Question 1: (6 points) Find all real numbers t such that the distance from the point $(2, 1)$ and the point $(6, t)$ is 5.

Question 2: (8 points)

(a) Find an equation of a line passing through the point $(2, 3)$ perpendicular to the line $y = 2x + 7$. Give your answer in the form $y = mx + b$ (slope-intercept form).

(b) Find a real number t such that the line through the points $(t, 7)$ and $(-5, 1)$ is parallel to the line $y = 3x - 8$.

Question 3: (6 points) Find the domain of the function $f(x) = \sqrt{|x + 2| - 3}$. Express your answer in interval notation.

Question 4: (8 points) Suppose you have a function $f(x)$ whose domain is the interval $[2, 4]$, and whose range is the interval $[-3, 1]$. Define a new function $g(x)$ by the following sequence of transformations:

(1) Reflect the graph of f over the x-axis.
(2) Stretch the graph of horizontally by a factor of 2.
(3) Shift the graph vertically downwards by 4 units.

(a) Find a formula for g in terms of f.

(b) What is the domain of g?

(c) What is the range of g?

Question 5: (8 points) Define the function $f(x) = \dfrac{x + 2}{x - 3}$.

(a) Find a formula for the inverse function, f^{-1}.

(b) State the domain of f.

(c) State the domain of f^{-1}.

(d) State the range of f.

(e) State the range of f^{-1}.

Question 6: (3 points) Find a polynomial of degree 3 that has 0, 4, and -3 as its roots. You do not need to simplify your answer. (Note: There are multiple possible answers to this question.)