Math 120C   **Second Midterm**   **Autumn 2015**

Your Name   Your Signature

Student ID #

                                        Charlie   Jonathan
                          Section   11:30   12:30   11:30   12:30
                          (circle one)   CA   CB   CC   CD

Problem	Total Points	Score
1	6	
2	6	
3	13	
4	13	
5	12	
Total	50	

- This exam is closed book. You may use one $8\frac{1}{2} \times 11$ sheet of notes.

- Do not share notes.

- You may use a calculator, but it must be a Texas Instruments TI-30X IIS.

- In order to receive credit, you must show your work. Do not do computations in your head or only on your calculator. Instead, write them out on the exam paper.

- **Place a box around** YOUR FINAL ANSWER **to each question.**

- If you use a trial and error (or guess and check) method when an algebraic method is available, you will not receive full credit.

- If you need more room, use the backs of the pages and indicate to the reader that you have done so.

- Raise your hand if you have a question.

1 (6 points)   Let $\phi(t) = \dfrac{4t + 5}{11 - 3t}$. Find a formula for $\phi^{-1}(t)$.

2 (6 points)   Let $f(x) = |x^2 - 4|$ and $g(x) = 2(x + 5)$. Write out the multipart rule for the composition $f(g(x))$.

3 (13 points)   Clovis is deciding how much to charge for his self-published novel. The number of copies he sells is a linear function of the amount that he charges.

If he charges $15 per copy, he'll sell 350 copies.

If he charges $30 per copy, he'll sell 230 copies.

(a) (6 points)   Find a function $f(x)$ for the **total amount of money** Clovis earns by charging $x per copy.

(b) (7 points)   How much should he charge in order to **maximize** his revenue?

4 (13 points)   The population of Hawai'i was 1 million in 1980. It rose to 1.4 million in 2012.

The population of Alaska was 0.5 million in 1984. It grew to 0.7 million in 2009.

(a) (4 points)   Compute and exponential function that models the population of Hawai'i. Take $t = 0$ in 1980.

(b) (4 points)   Compute and exponential function that models the population of Alaska. Take $t = 0$ in 1980.

(c) (5 points)   In what year will Hawai'i have twice as many people as Alaska?

5 (12 points)   Find the linear-to-linear function whose graph passes through the points $(0, 1)$, $(1, 5)$ and $(2, 7)$. What is its horizontal asymptote?