

# Assignment 2

## Calculus I with Review Math 150 - D400 (Spring 2010)

**Quiz date:** Friday, January 22, 2010

Complete this assignment by Tuesday in your *homework journal*. This will give you plenty of time to make sure you understand the material before the quiz at the end of Friday's class.

Some suggestions for using your homework journal are:

- Do rough work on scratch paper.
- If you find one solution, try to find another (a simpler solution may reveal itself).
- When you find a solution, try to see it as a whole without all the little details.
- Do questions in order and clearly label question and section numbers.
- Grade your own assignment when solutions are posted. Catch your mistakes now when the stakes are low rather than making them on exams.

To obtain maximum marks on the quiz, your answer should be in a form that another student could understand without undue effort: a poorly expressed but correct result is not sufficient.

### Questions from textbook(s):

| <i>text</i> | <i>section</i> | <i>question</i> | <i>done</i>              | <i>checked</i>           | <i>corrected</i>         | <i>study MT</i>          | <i>study final</i>       | <i>type 1</i>                   | <i>comment</i>                       |
|-------------|----------------|-----------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------|--------------------------------------|
| St.         | 1.5            | 13              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | transformations of $e^x$             |
|             |                | 16              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | finding domains                      |
|             |                | 17              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | CE                              | families (i.e. "types") of functions |
|             |                | 19              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | difference quotient (algebra)        |
|             |                | 25              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | WP                              | modeling growth                      |
| St.         | 1.6            | 9               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | identifying one-to-one functions     |
|             |                | 16              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | CE                              | working with inverse functions       |
|             |                | 26              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | TC: Do this in under 3 minutes?      |
|             |                | 35              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | TC: Do this in under 2 minutes?      |
|             |                | 48              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | solving equations with exp & log     |
|             |                | 63              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | CE                       | inverse trigonometric functions |                                      |
| Eb.         | Ch.3<br>p.133  | 7               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | function domains & simplification    |
|             |                | 10              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | interval notation                    |
|             |                | 12ace           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | solving inequalities                 |
| St.         | 2.1            | 3               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | CM: use a computer or calculator     |
|             |                | 6               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | CM: use a computer or calculator     |
|             |                | 8               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | RE                              | CM: use a computer or calculator     |

<sup>1</sup>See the legend on last page of this assignment for what these acronyms mean.

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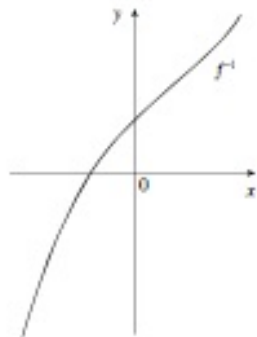
**Additional questions:**

These questions are made up by your instructor and may require a blend of ideas that we have encountered so far in the course. They are similar to exam style questions in that it is not entirely clear what section of the text is directly related to solving the problem. You will have to decide what tools/techniques are required.

A1. Let  $f$  be a one-to-one function whose *inverse* function is given by the formula

$$f^{-1}(x) = x^5 + 2x^3 + 3x + 1.$$

- (a) Compute  $f^{-1}(1)$  and  $f(1)$ .
- (b) Compute the value of  $x_0$  such that  $f(x_0) = 1$ .
- (c) Compute the value of  $y_0$  such that  $f^{-1}(y_0) = 1$ .
- (d) Below is a graph of  $f^{-1}$ . Draw an approximate graph of  $f$ .



|                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| done                     | checked                  | corrected                | study MT                 | study final              |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

A1. Suppose the point  $(1, 2)$  lies on the graph of the function  $f$ .

- (a) Find a point on the graph of the function  $g(f(x))$ , where  $g(y) = y - 1 + \arctan(y/2)$ .
- (b) Find *two* points on the graph of the function  $f(h(x))$ , where  $h(x) = x^2 - \pi x + \cos^2 x$ .

|                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| done                     | checked                  | corrected                | study MT                 | study final              |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

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**Extra-Practice Questions:**

Try these questions for some more practice. The more practice you get the better you will understand the material and the better you will do on quizzes and exams.

- (Stewart) Section 1.5: 2, 3, 5, 11, 12, 15, 21, 29
  - (Stewart) Section 1.6: 3, 7, 11, 17, 22, 25, 33, 45, 47, 61, 65, 67, 71
  - (Stewart) Section 2.1: 1, 5, 7
  - (Ebersole) Chapter 3: (page 131) 1, 2, 6; (page 130) 1, 2, 3
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**Legend (for "type" of question):**

**RE** = Routine Exercise: This is something you should be able to do in your sleep ;-). Your goal is to be able to answer these questions quickly and accurately every time. These form the foundations of your skill set.

**TC** = Time Challenge: Speed and accuracy are important factors in solving this type of routine exercise. Try to do these exercises within the time limit, usually 5 minutes. If you need more time than that, its o.k., but keep practicing! Solving these routine exercises provides a foundation for solving more involved problems, and is essential in performing well on quizzes and exams.

**WP** = Word Problem: Translating words into expressions (also known as modeling): Master this skill now, we will be using this all term.

**CD** = Concepts and Definitions: These questions relate to your understanding of the "new language" we are introducing. They should help you remember the important definitions and theorems.

**CE** = Concepts and Explorations: This indicates a question which is testing your understanding of the fundamentals. It is not a routine exercise since the solution process may not be obvious at first glance. It may take a little bit of thought to figure out what to do, don't be afraid to play around with some ideas. You'll learn more by making mistakes and taking routes which lead to dead ends. You must be able to do these types of questions to succeed in learning this material.

**HL** = Higher Level Understanding: This indicates a question which is testing understanding at a higher level. These questions will require more thought than a RE or CE so don't be discouraged if you can't see how to do this immediately. Perseverance and playing around with ideas is the key to these questions. Understanding this material at this level is an expected outcome of this course.

**CM** = Computer of Computational Device: This indicates a question in which a computer or calculator is needed.

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**Selected Hints & Answers:**

**1.6:** 16. Don't try to find an expression for  $f^{-1}$ , it would be difficult to do and isn't needed.

26.  $f^{-1}(x) = \ln(x) - \ln(1 - 2x)$  48. (a)  $x = \frac{1}{2}(\ln 7 - 3)$ , (b)  $x = \frac{1}{2}(5 - e^{-3})$