

MAT – 112: Calculus I and Modeling

Homework 1

Instructor: Thomas R. Cameron

Due: 1/26/2018

Instructions

You must complete all book problems and other problems. The book problems are intended to give you practice in solving problems from the textbook. They are graded based upon completion and correctness. The other problems are intended to help further your understanding of the concepts from a theoretical point of view. These problems are more rigorously graded, with a high expectation on the student providing clear, detailed, and justified answers. Lastly, you may work with other students and ask me any questions, but you may not look up solutions online. You must write your solutions independently so I may interpret your understanding while grading.

Book Problems

§1.1: 29, 32, 36, 78

§1.3: 29, 37

§1.4: 7, 35, 49

§1.5: 49

Other Problems

Problem 1. Use the definition of perpendicular lines from the book in order to show that two lines are perpendicular if and only if they intersect at a 90° angle.

Your explanation should include a clearly labeled diagram.

Problem 2. Use the definition of a function from the book in order to show that if f is a function from A onto all of B and g is a function from B onto all of C , then $h = g \circ f$ is a function from A onto all of C .

Problem 3. Use the method of completing the square to transfer the quadratic $ax^2 + bx + c$ from standard form to vertex form. Once in vertex form, identify the vertex, axis of symmetry, x -intercept, and y -intercept.

Problem 4. Let $f(x) = \frac{p(x)}{q(x)}$, where $p(x)$ is a polynomial of degree m and $q(x)$ is a polynomial of degree n . Answer each of the following.

- (i.) How many possible x -intercepts and y -intercepts does the graph of f have? When will the graph have no x -intercepts, when will it have no y -intercepts?
- (ii.) How many possible vertical and horizontal asymptotes does the graph of f have? When will the graph have no vertical asymptotes, when will it have no horizontal asymptotes?
- (iii.) Consider the case when $p(x)$ and/or $q(x)$ have multiple roots, and when $p(x)$ and $q(x)$ share some roots. What happens to the x -intercepts and vertical asymptotes in these cases?