Math205 Test 2

October 2010

Answer all questions and give complete reasons and checks for your answers. The parts of the questions are weighted as shown and the questions can be answered in any order. Please do not erase any working and hand in your rough work too.

1. Simplify this statement using logic algebra: [6]

$$(q \to p) \to (q \wedge p)$$

2. (a) Prove by contradiction that when the square of a number is the same as two less than three times it, twice that number is at least one. [7]

   (b) Verify your result by marking on the real line where the statements are true and explain how they are related. [2]

3. (a) Explain why this statement is true: [2]

$$\forall n \in \mathbb{Z}; n^4 \geq n$$

   (b) Give a number m which shows that this statement is false: [1]

$$\forall m \in \mathbb{Z}; \cos(m\pi) > -1$$

   (c) Create a non-trivial statement which is true for all positive odd integers but no other integers. [2]