MATH 321 WEEK 2 UNCLAIMED PROBLEM SOLUTIONS

(1) **1.2.2.** Assume for contradiction that there exists a rational number $r = \frac{p}{q}$ satisfying $2^r = 3$. Taking both sides of the equation $2^r = 3$ to the qth power yields

$$2^p = 2^{rq} = (2^r)^q = 3^q$$

implying that 3^q is either even or the reciprocal of an even number for some $0 \neq q \in \mathbb{Z}$. But 3^q is either the product of 3s (which is odd) or the reciprocal of such a product (which is the reciprocal of an odd number), giving a contradiction.

(2) **1.2.10.**
   (a) False. See below.
   (b) False. Let $a = b$. Then $a < b + \epsilon$ for all $\epsilon > 0$, but certainly $a \not< b$.