

Math 215 – Fall 2017

Practice Homework 4 – Assigned September 18th, due September 21th

Note: Remember that you must show your work to get full credit for a problem. Also could you please write your instructor's name on your homework page – this will help us get HW back to you efficiently. We introduce a new definition for this assignment. Here it is:

Definition: Let k and n be integers, with $k \neq 0$. If there is an integer q such that $kq = n$, then we say that k *divides* n . This is written in symbols as $k|n$.

1. . Are the following statements true or false? If the statement is true please prove it; if it is false first negate the statement and then prove the negation.

- (a) $\forall n \in \mathbb{N}, \frac{2n}{2n+1} < 1$
- (b) $\forall x \in \mathbb{Z}, \frac{2x}{2x+1} < 1$
- (c) $\forall n \in \mathbb{N}, (3|n \wedge 2|n) \longrightarrow 6|n$
- (d) $\exists x \in \mathbb{R}, x^2 + x - 2 = 0$
- (e) $\exists x \in \mathbb{R}, (x + 1)^2 + 1 = 0$
- (f) $\forall m \in \mathbb{N}, \exists n \in \mathbb{N}, n|m$
- (g) $\exists n \in \mathbb{N}, \forall m \in \mathbb{N}, n|m$
- (h) $\forall m \in \mathbb{N}, \exists n \in \mathbb{N}, m|n$
- (i) $\exists n \in \mathbb{N}, \forall m \in \mathbb{N}, m|n$
- (j) $\forall x \in \mathbb{R}, \exists y \in \mathbb{R}, x = e^y$
- (k) $\forall x \in \mathbb{R}, \exists y \in \mathbb{R}, x^2 + 1 = e^y$