

## Math 215. Homework 2

due 01/30/08

1. Considering possible remainders of an integer  $n$  divided by 3 show that  $n^3 - n$  is divisible by 3.

2. Show that  $|x| \cdot |y| = |x \cdot y|$

3. Show that for  $x \geq 0, y \geq 0$  one has

$$\frac{x + y}{2} \geq \sqrt{xy}$$

4. Show that for  $x > 0, y > 0$  one has:

$$\frac{2}{\frac{1}{x} + \frac{1}{y}} \leq \sqrt{x \cdot y}$$

(i.e. harmonic mean does not exceed geometric mean).

Hint: use “proof backward” method in the last two problems.