

MthT 430 Problem Set 1

In class August 29, 2007 – Turn in September 5, 2007

Group Work Rules:

- You are encouraged to work together!
- Away from the group, do your own neat write up of the problems.
- Acknowledge the group members and any other person/source you use.

1. (Warmup) For all x , $x^2 \geq 0$ and $x^2 = 0$ iff $x = 0$.

2. Spivak 1.17

(a) Find the smallest possible value of $2x^2 - 3x + 4$. Hint: Complete the square . . .

(b) Find the smallest possible value of $x^2 - 3x + 2y^2 + 4y + 2$.

(c) Find the smallest possible value of $x^2 + 4xy + 5y^2 - 4x - 6y + 7$. (A little harder)

Spivak p. 18

3. (Spivak 1.20) Prove that if

$$|x - x_0| < \frac{\epsilon}{2} \text{ and } |y - y_0| < \frac{\epsilon}{2},$$

then

$$|(x + y) - (x_0 + y_0)| < \epsilon,$$

$$|(x - y) - (x_0 - y_0)| < \epsilon.$$

4. (Spivak 1.21) Prove that if

$$|x - x_0| < \min\left(\frac{\epsilon}{2|y_0| + 1}, 1\right) \text{ and } |y - y_0| < \min\left(\frac{\epsilon}{2|x_0| + 1}, 1\right),$$

then

$$|xy - x_0y_0| < \epsilon.$$