

ECS20

Discussion 6: 10/27 to 11/2 2016

Exercise 1: proofs

- a) Let x and y be two integers. Show that if $2x+5y = 14$ and $y \neq 2$, then $x \neq 2$
- b) Let x and y be two integers. Show that if x^2+y^2 is odd, then $x+y$ is odd

Exercise 2: floor and ceiling

- a) Let x be a real number. Show that $\left\lceil \frac{\left\lfloor \frac{x}{2} \right\rfloor}{2} \right\rceil = \left\lfloor \frac{x}{4} \right\rfloor$
- b) Show that if n is an odd integer, then $\left\lceil \frac{n^2}{4} \right\rceil = \frac{n^2+1}{3}$

Exercise 3: Growth of functions

- a) Show that if a function $f(x)$ from $\mathbb{R}$ to $\mathbb{R}$ is $O(x)$, then $f(x)$ is $O(x^2)$.
- b) Show that the function $f(n) = n \log(n^2 + 1) + \frac{\log(n)}{n^2 + 1}$ is $O(n \log(n))$

Exercise 4: Algorithms

Describe an algorithm that interchanges the values of the variables x and y , using only assignments.