4317 Final

Thursday, October 25, 2018 9:47 PM

Last Name:
First Name:
BU or BG:

Which 4 problems do you want graded?

Problem 1 (5 points): Prove that the set $\{(x, y){:}\ x^2 + y > 0\}$ is open in the plane with the usual distance.

Problem 2 (5 points): Prove that any bounded open subset of R is the union of disjoint open intervals.

Problem 3 (5 points): Show that if the function $f{:}\, R \rightarrow R$ is uniformly continuous, then the sequence of functions $f_n(x) = f(x + \frac{1}{n})$ converges uniformly.

Problem 4 (5 points): Show that if f is a continuous real-valued function on the interval $[0,1]$, there exists $0 < y < 1$ such that $\int_0^1 f(x)dx = f(y)$.

Problem 5 (5 points): Show that if f is a continuous real-valued function on $\{x \in R{:}\, x \geq 0\}$ and $\lim_{x\rightarrow\infty} f(x) = c$, then $\lim_{x\rightarrow\infty} \frac{1}{x}\int_0^x f(t)dt = c$.