1. Suppose *f* is Reimann integrable on [a,b] and let for all x . Prove that F is continuous on [a,b] (hint: f must be bounded)
2. Let F(x) = and let f(x) = F’(x)
3. Prove that F’(x) exists for all x
4. Find f(x) for all x , and prove that f is reimann integrable on [-1, 1]
5. Find
6. Let (x) = sin()

Prove converges uniformly on to a differentiable function, yet (0) *diverges*.

1. Let for all x . Prove that is *not* uniformly convergent on [. (hint: suppose false and deduce a contradiction)

**Note: theorem included below to be used as an aid with the hint in #4**

Suppose is defined on a finite interval ***I*** and is continuous on ***I.*** Suppose converges uniformly on ***I***. Suppose moreover that there exists at least one point a ***I*** such that is a convergent sequence of real numbers. Then there exists a differentiable function *f* such that uniformly on ***I***, and f’(x) on ***I***