Calculus 1.4 Intermediate Value Thm, Squeeze Thm, Continuity

Homework: pages 80-81  
#’s 61-69 odd, 87, 95, 98, 101, 102

-Understand and use the Intermediate Value Theorem  
-Understand the Squeeze Theorem  
-Use properties of continuity to make an interval continuous

**Properties of Continuity**  
If the functions *f* and *g* are continuous at x=c, then the following functions are also continuous at c:

1) Scalar multiple:   
2) Sum and difference:   
3) Product:   
4) Quotient:   
5) Composition: f 𝜊 g

**The Intermediate Value Theorem (IVT)**

If *f* is continuous on the closed interval [a,b] and *k* is any number between f(a) and f(b), then there is at least one number *c* in [a,b] such that *f*(c) = *k*.

Example) Verify the IVT applies to the indicated interval and find the value of c guaranteed by the theorem.

f(x) = x2 – 6x + 8, [0, 3], f(c) = 0

Why do we care about the Intermediate Value Theorem?

If we know that a function is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and this function has \_\_\_\_\_\_\_\_\_\_\_\_\_ values of f(x) and

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ values of f(x), then we can conclude \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Squeeze Theorem**

If h(x) ≤ f(x) ≤ g(x) for all x in an open interval containing c, except possibly at c itself, and if , then exists and is equal to L.

**Making Piecewise Functions Continuous**

For a piecewise function to be continuous each function must be continuous on its specified interval and the limit of the endpoints of each interval must be equal.

Example)  
What value of k will make the given piecewise function f(x) continuous?

sin2x, x ≤ π  
f(x) = 2x + k, x > π



Example)  
For what value of k is the function f(x) = continuous at x = -3?