Calculus Section 8.8 Improper Integrals: Infinite Discontinuities  
-Evaluate an improper integral that has an infinite limit of integration  
-Evaluate an improper integral that has an infinite discontinuity

Homework: page 575 #’s 33 – 36, 39

A function that has a vertical asymptote at x = a has an **infinite discontinuity** at x = a. Integrals with infinite discontinuities must be evaluated with limits to circumvent the requirements of the 1st Fund. Thm. of Calculus.

**Definition of Improper Integrals with Infinite Discontinuities**1. If *f* is continuous on the interval [a, b) and has an infinite discontinuity at b, then   
2. If *f* is continuous on the interval (a, b] and has an infinite discontinuity at a, then   
3. If *f* is continuous on the interval [a, b], except for some c in (a, b) at which *f* has an infinite discontinuity, then   
In the first two cases, the improper integral **converges** if the limit exists—otherwise, the improper integral **diverges**. In the third case, the improper integral on the left diverges if either of the improper integrals on the right diverges.

**Example) Improper Integral with an Infinite Discontinuity Example) Improper Integrals that Diverge**Evaluate  Evaluate 

**Example) Improper Integral with Interior Discontinuity Example) Doubly Improper Integral**Evaluate  Evaluate 