Section 4.7 L’Hopital’s Rule

# Topic 1: L’Hopital’s Rule for the Indeterminate Form

**Theorem: L’Hopital’s Rule**

Suppose *f* and *g* are differentiable on an open interval *I* containing *a* with  on *I* when . If , then



provided the limit on the right exists (or is ). The rule also applies if  is replaced with , , , or .

# Topic 2: L’Hopital’s Rule for the Indeterminate Form

**Theorem: L’Hopital’s Rule (****)**

Suppose *f* and *g* are differentiable on an open interval *I* containing *a* with  on *I* when . If  and , then



provided the limit on the right exists (or is ). The rule also applies if  is replaced with , , , or .

# Topic 3: Indeterminate Forms () and ()

L’Hopital’s Rule cannot be applied directly to limits in the forms () or (). However, it is sometimes possible to convert limits in these forms to the form  or and then apply L’Hopital’s Rule to find the limit.

# Topic 4: Indeterminate Forms ,  , and

**Procedure**

Assume  has the indeterminate form of ,  , and .

1. Analyze . This limit can be put in the form  or , both of which are handled with L’Hopital’s Rule.
2. When *L* is finite, then. If  or , then  or , respectively.