

Section 4.4: Indeterminate forms and l'Hospital's Rule

- (1) In this section, we learn about various indeterminate forms and how we can use l'Hospital's rule to help evaluate limits of these forms. What does l'Hospital's rule say? When can we use it?
- (2) What is an indeterminate form? There are 7 examples given in this section. What are they?
- (3) The following forms are NOT indeterminate. For each form below, say what a limit having that form will evaluate to.
- (a) What does it mean that these forms are NOT indeterminate?
- (b) $\frac{0}{\infty}$
- (c) $\frac{\infty}{0}$
- (d) $\infty + \infty^*$
- (e) 0^1
- (f) 0^{∞^*}

*Usually, when we write ∞ in these forms, it could be replaced with $+\infty$ or $-\infty$, these cases specifically refer to $+\infty$.

(4) We know we can use l'Hopital's rule directly when evaluating limits of the form $\frac{0}{0}$ or $\frac{\infty}{\infty}$. What can we do if we have an indeterminate product?

(5) What can we do if we have an indeterminate difference?

(6) What can we do if we have an indeterminate power? (Note: There are a few concepts/techniques that come up multiple times in the course. One of them is the following: "If you have an x or function of x in the exponent that you need to "deal with," take the \ln of both sides. This will allow us bring down the function of x ". We saw in this in section 3.6. In this section, we see this technique used for taking limits.)