

Handout # 7 Limits Involving ∞ , etc.

Indeterminate Cases:

$\frac{\pm 0}{\pm 0}$	$\frac{\pm \infty}{\pm \infty}$	$(\pm \infty)(\pm 0)$	$-\infty + \infty$
$1^{\pm \infty}$	$(+0)^{\pm 0}$	$(+\infty)^{\pm 0}$	

Other Limits involving ∞ (examples):

$$\lim_{u \rightarrow \pm \infty} \left(1 + \frac{1}{u}\right)^u = e \qquad \lim_{x \rightarrow 0} \frac{\sin x}{x} = 1 \qquad \ln(+0) = -\infty \qquad \ln(+\infty) = +\infty$$

$$\arctan(+\infty) = \frac{\pi}{2} - 0 \qquad \arctan(-\infty) = -\frac{\pi}{2} + 0 \qquad \text{arc cot}(+\infty) = +0 \qquad \text{arc cot}(-\infty) = \pi - 0$$

$$+\infty - 7 = +\infty \qquad -\infty + 7 = -\infty \qquad (+\infty)(-\infty) = -\infty \qquad (\pm \infty)^2 = +\infty$$

$$\frac{-7}{+\infty} = -0 \qquad \frac{-7}{-0} = +\infty \qquad (-7)(+\infty) = -\infty \qquad \frac{+\infty}{-0} = -\infty$$

$$\frac{+0}{-\infty} = -0 \qquad (-\infty)^3 = -\infty \qquad \sqrt{+\infty} = +\infty \qquad \sqrt[3]{-\infty} = -\infty$$

$$(2)^{+\infty} = +\infty \qquad (3)^{-\infty} = +0 \qquad (0.5)^{+\infty} = +0 \qquad (0.7)^{-\infty} = +\infty$$

$$(+\infty)^{-\infty} = +0 \qquad \tan\left(\frac{\pi}{2} - 0\right) = +\infty \qquad \tan\left(\frac{\pi}{2} + 0\right) = -\infty \qquad \tan\left(-\frac{\pi}{2} + 0\right) = -\infty$$

$$\cot(+0) = +\infty \qquad \cot(\pi - 0) = -\infty \qquad \cot(-0) = -\infty \qquad \cot(\pi + 0) = +\infty$$

$\cos \infty$, $\sin \infty$, $\tan \infty$, and $\cot \infty$ do not exist.