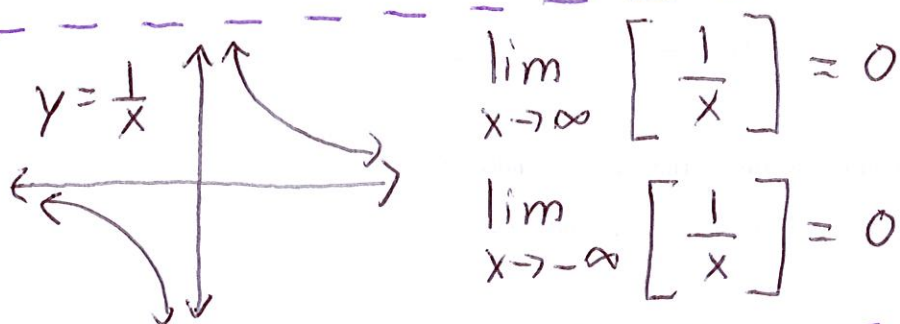# MA 16020 Exam 2 Study Guide : Cal 1

Important Limits to know for the exam

$y = e^{-ax}$ $\lim\limits_{x \to -\infty} \left[e^{-ax} \right] = +\infty$

$\lim\limits_{x \to \infty} \left[e^{-ax} \right] = 0$

$y = e^{ax}$ $\lim\limits_{x \to -\infty} \left[e^{ax} \right] = 0$

$\lim\limits_{x \to \infty} \left[e^{ax} \right] = \infty$

$y = \ln(ax)$ $\lim\limits_{x \to 0^+} \left[\ln(ax) \right] = -\infty$

$\lim\limits_{x \to \infty} \left[\ln(ax) \right] = \infty$

$y = \frac{1}{x}$ $\lim\limits_{x \to \infty} \left[\frac{1}{x} \right] = 0$

$\lim\limits_{x \to -\infty} \left[\frac{1}{x} \right] = 0$

$y = \frac{1}{x^2}$ $\lim\limits_{x \to -\infty} \left[\frac{1}{x} \right] = 0$

$\lim\limits_{x \to \infty} \left[\frac{1}{x} \right] = 0$
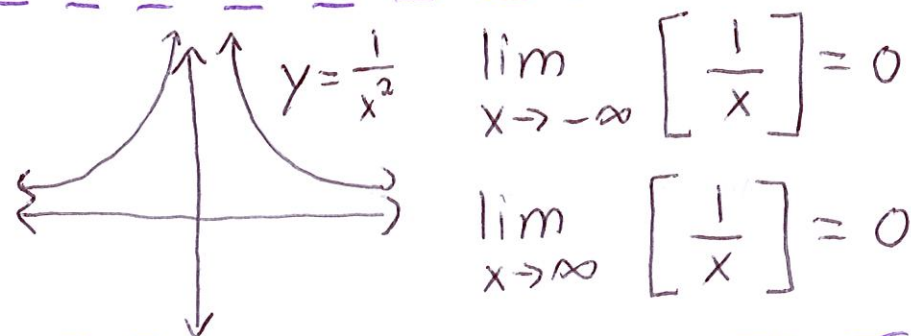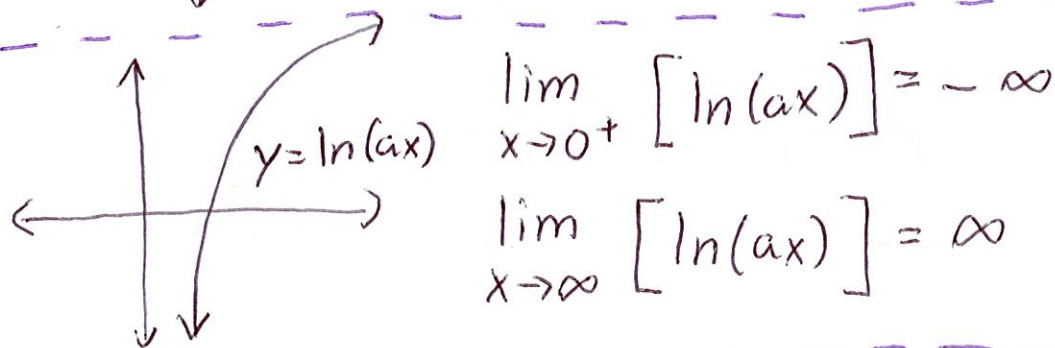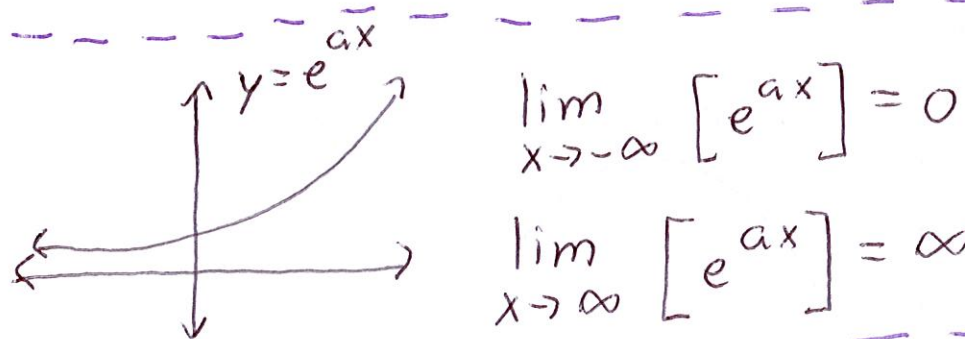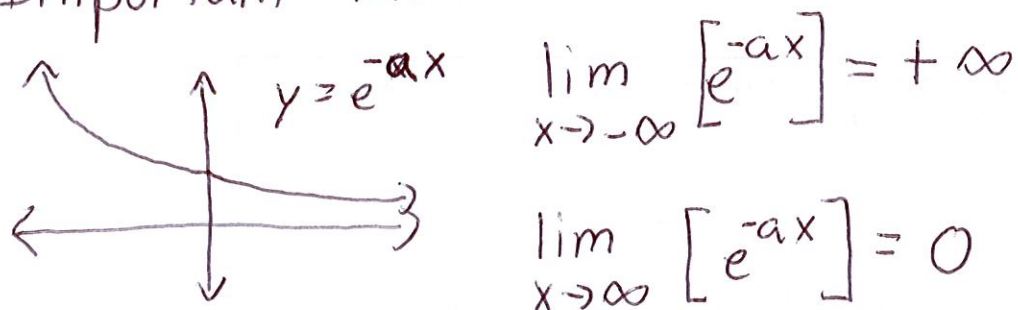
Also polynomials as $x \to \infty$, the limit goes to $\pm\infty$

Differentiation Rules	Integration Rules
$\frac{d}{dx}(c) = 0$	$\int 0\, dx = C$
$\frac{d}{dx}(kx) = K$	$\int k\, dx = kx + C$
$\frac{d}{dx}(kf(x)) = kf'(x)$	$\int kf'(x)\, dx = kf(x) + C$
$\frac{d}{dx}(x^n) = nx^{n-1}$	$\int x^n\, dx = \frac{x^{n+1}}{n+1} + C$ when $n \neq -1$
$\frac{d}{dx}(\sin x) = \cos x$	$\int \cos x\, dx = \sin x + C$
$\frac{d}{dx}(\cos x) = -\sin x$	$\int \sin x\, dx = -\cos x + C$
$\frac{d}{dx}(\tan x) = \sec^2 x$	$\int \sec^2 x\, dx = \tan x + C$
$\frac{d}{dx}(\cot x) = -\csc^2 x$	$\int \csc^2 x\, dx = -\cot x + C$
$\frac{d}{dx}(\sec x) = \sec x \tan x$	$\int \sec x \tan x\, dx = \sec x + C$
$\frac{d}{dx}(\csc x) = -\csc x \cot x$	$\int \csc x \cot x\, dx = -\csc x + C$
$\frac{d}{dx}(e^x) = e^x$	$\int e^x\, dx = e^x + C$
$\frac{d}{dx}(\ln x) = \frac{1}{x},\ x > 0$	$\int \frac{1}{x}\, dx = \ln|x| + C$

- Note if the integral has bounds we do not use +C.

- Always take derivative of your answer, before evaluating when integrating. Especially when you have trig functions!!