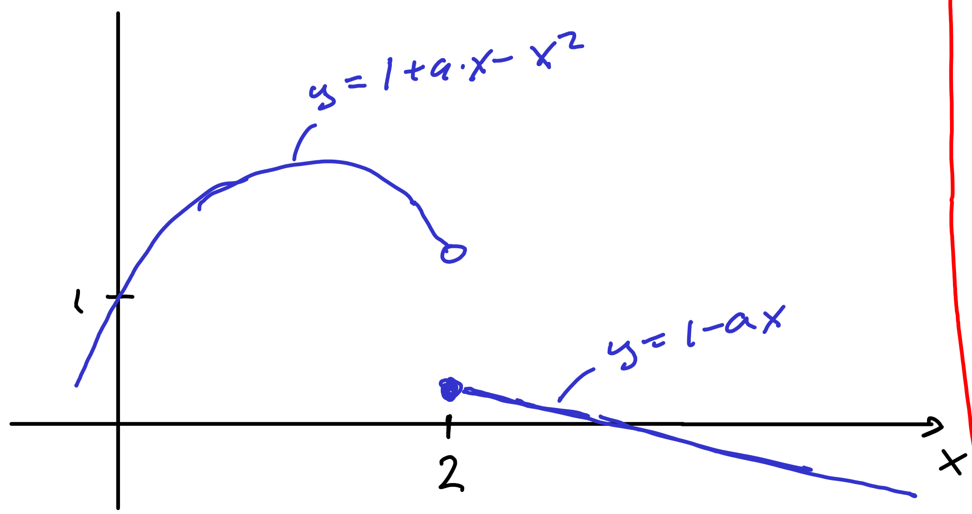
Rep. Lekt. 13



- $x = 2$ i $y = 1 + ax - x^2$ ger
  $y = 1 + 2a - 2^2 = 2a - 3$
- $x = 2$ i $y = 1 - a\cdot x$ ger
  $y = 1 - a\cdot 2$
- Välj a så de blir lika
  $2a - 3 = 1 - a\cdot 2$
  $4a = 4$
  $\boxed{a = 1}$

Intressant

$$x = 0,99999999\ldots\ldots$$
$$10x = 9,99999999\ldots\ldots$$

$$10x - x = 9$$
$$9x = 9$$
$$x = 1$$

Givet

$$\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$$

$$\frac{\frac{a}{b}}{c} = \frac{a}{b\cdot c}$$

Ex:
$$\lim_{x\to 0} \frac{\tan x}{x} = \lim_{x\to 0} \frac{\frac{\sin x}{\cos x}}{x} = \lim_{x\to 0} \frac{\sin x}{\cos x \cdot x}$$

$$= \lim_{x\to 0} \underbrace{\frac{1}{\cos x}}_{\frac{1}{1}} \cdot \underbrace{\frac{\sin x}{x}}_{\to 1} = \frac{1}{1}\cdot 1 = 1$$

Ex: $\lim\limits_{x\to 0} \dfrac{\sin 4x}{x} = \lim\limits_{x\to 0} 4\cdot \underbrace{\dfrac{\sin 4x}{4x}}_{\to 1} = 4\cdot 1 = 4$ $\qquad \lim\limits_{\theta\to 0}\dfrac{\sin\theta}{\theta} = 1$

Ex: $\lim\limits_{x\to 0} \dfrac{\sin 3x}{\sin 5x} = \left[\dfrac{0}{0}\right] = \lim\limits_{x\to 0} \dfrac{\frac{\sin 3x}{x}}{\frac{\sin 5x}{x}} = \lim\limits_{x\to 0} \dfrac{3\cdot \overbrace{\frac{\sin 3x}{3x}}^{\to 1}}{5\cdot \underbrace{\frac{\sin 5x}{5x}}_{\to 1}}$

$= \dfrac{3\cdot 1}{5\cdot 1} = \dfrac{3}{5}$

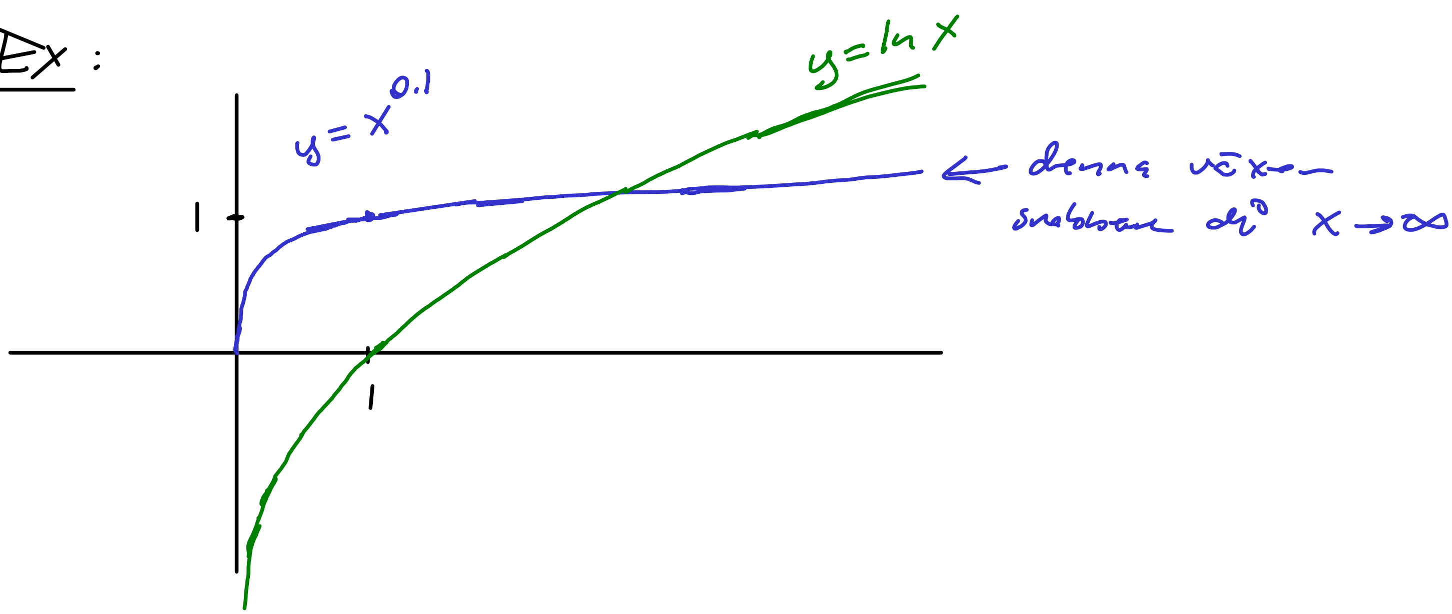
Ex: $\lim\limits_{x\to 0} \dfrac{\tan 7x}{\sin x} = \lim\limits_{x\to 0} \dfrac{\frac{\sin 7x}{\cos 7x}}{\sin x} = \lim\limits_{x\to 0} \dfrac{\sin 7x}{\cos 7x\cdot \sin x}$

$= \lim\limits_{x\to 0} \dfrac{1}{\cos 7x}\cdot \dfrac{\sin 7x}{\sin x} = \lim\limits_{x\to 0} \dfrac{1}{\cos 7x}\, \dfrac{\frac{\sin 7x}{x}}{\frac{\sin x}{x}}\cdot$

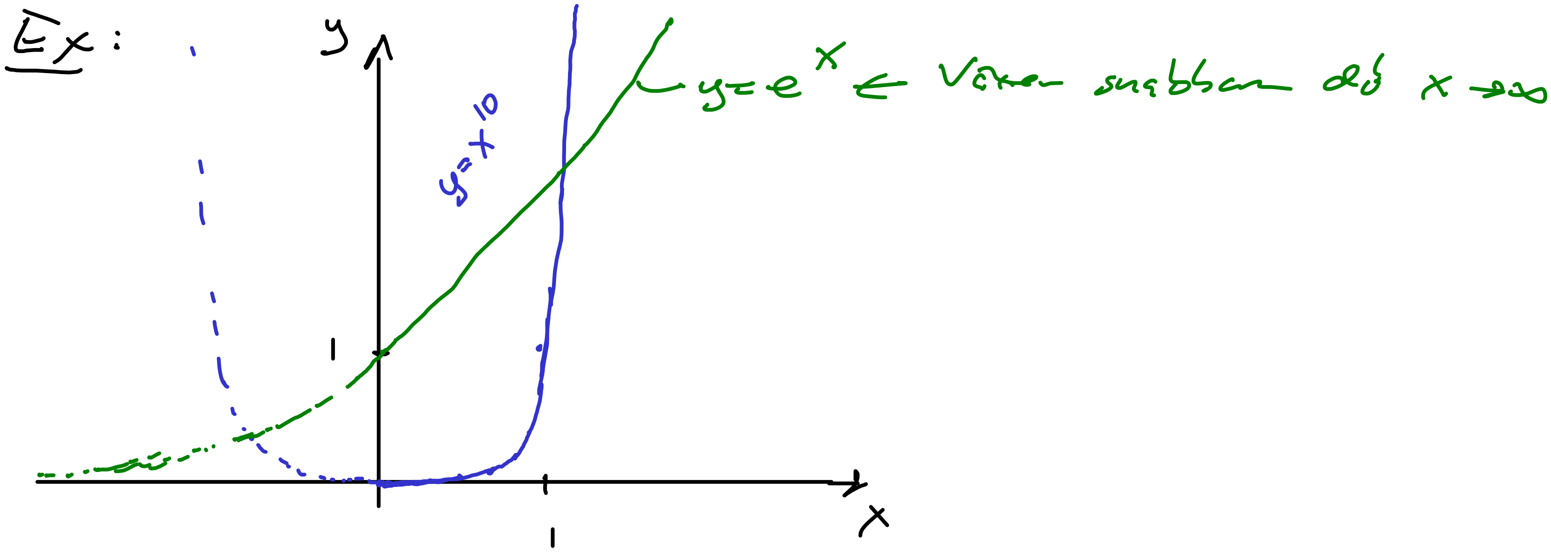
$= \lim\limits_{x\to 0} \underbrace{\dfrac{1}{\cos 7x}}_{\to \frac{1}{1}}\cdot \dfrac{7\cdot \overbrace{\frac{\sin 7x}{7x}}^{\to 1}}{\underbrace{\frac{\sin x}{x}}_{\to 1}} = \dfrac{1}{1}\cdot \dfrac{7\cdot 1}{1} = 7$

Ex: $\lim\limits_{x\to 1} \dfrac{\sin x}{x} = \dfrac{\sin 1}{1} = \sin 1$

Ex:



Ex:



Ex:

$$\lim_{x\to\infty}\frac{e^{2x}+e^x\ln x}{e^{2x}-2xe^x+x^2}=\lim_{x\to\infty}\frac{\cancel{e^{2x}}\left(1+\frac{e^x\cdot\ln x}{e^{2x}}\right)}{\cancel{e^{2x}}\left(1-\frac{2xe^x}{e^{2x}}+\frac{x^2}{e^{2x}}\right)}$$

$$=\lim_{x\to\infty}\frac{1+\overset{\to 0}{\frac{\ln x}{e^x}}}{1-2\cdot\underset{\to 0}{\frac{x}{e^x}}+\underset{\to 0}{\frac{x^2}{e^{2x}}}}=\frac{1+0}{1-2\cdot 0+0}=1$$

$$\frac{e^x}{e^{2x}}=e^{x-2x}=e^{-x}=\frac{1}{e^x}$$

Ex:

$$\lim_{x\to\infty}\frac{(x+1)\cdot 2^x-3^x+\ln x}{3^x+x^5\cdot 2^x}=\left[\frac{\pm\infty}{\infty}\right]=\lim_{x\to\infty}\frac{\cancel{3^x}\left((x+1)\cdot\frac{2^x}{3^x}-1+\frac{\ln x}{3^x}\right)}{\cancel{3^x}\left(1+x^5\frac{2^x}{3^x}\right)}$$

$$=\lim_{x\to\infty}\frac{\overset{\to 0}{\frac{x+1}{(\frac{3}{2})^x}}-1+\overset{\to 0}{\frac{\ln x}{3^x}}}{1+\underset{\to 0}{\frac{x^5}{(\frac{3}{2})^x}}}=\frac{0-1+0}{1+0}=-1$$

$$\boxed{\frac{2^x}{3^x}=\frac{1}{\frac{3^x}{2^x}}=\frac{1}{(\frac{3}{2})^x}}$$

$$\frac{2^x}{3^x}=\left(\frac{2}{3}\right)^x\underset{x\to\infty}{\to}0$$