Let $a$

Supp

the li

Simil

and v

**L'Hô**

Supp

or $\frac{\infty}{\infty}$.

Note:

-

-

-

**Exam**

Since

**Exam**

Since

**Example**

Since lim

**Example**

Since lim

**Example**

Since lim

**Example**

Since lim

The limit

## Other types of indeterm

In the event that the limit lim

convert it into an indetermina

$f(x)g(x) = \frac{f(x)}{\frac{1}{g(x)}}$ or $f(x)g$

**Example 7** Find $\lim_{x\to0^+}$

Since $\lim_{x\to0^+} x = 0$ and lin

must first convert this produc

Using l'Hôpital's Rule, we hav

$$\lim_{x\to0}$$

**Example 8** Find $\lim_{x\to\infty} x$

Since $\lim_{x\to\infty} x = \infty$ and lin

can easily convert it into the li

l'Hôpital's Rule, we have:

$$\lim_{x\to\infty} x \tan\left(\frac{1}{x}\right)$$

**Example 9** Find $\lim_{x\to\infty} x$

It is not difficult to see that th

into the quotient $\lim_{x\to\infty} \frac{x^3}{e^{x^2}}$ w

we obtain:

$$\lim_{x\to\infty} x^3 e^{-x^2}$$

In
ca
co

**Ex**

Si
co

**Ex**

Si
fa
ty
fo

**Ex**

It's
an

An

**Example 13** Find $\lim_{x\to 1}$ (

Since $\lim_{x\to 1}\frac{x}{x-1} = \infty$ and l

must first convert this using a

$$\lim_{x\to 1}\left(\frac{x}{x-1} - \frac{1}{\ln \ldots}\right.$$

Since $\lim_{x\to 1}(x\ln x - x + 1)$

of type $\frac{0}{0}$. We can therefore a

$$\lim_{x\to 1}\left(\frac{x}{x-1} - \frac{1}{\ln x}\right) =$$

Since the limits of both the nu

$$\lim_{x\to 1}\left(\frac{x}{x-1}\right.$$

SOLU

1. li

=

2. li

=

=

3. lim

=

=

4. lim

=

5. lim

=

6. lim

=

=

13.

14.

15.

16.

21. $\lim_{x\to\infty}\dfrac{\ln(x-10)}{\ln(4x+1)}$ $\left(\text{type } \frac{\infty}{\infty}\right)$

$$= \lim_{x\to\infty}\frac{\left[\frac{1}{x-10}\right]}{\left[\frac{4}{4x+1}\right]}$$

$$= \lim_{x\to\infty}\frac{4x+1}{4x-40} \quad \left(\text{type } \tfrac{\infty}{\infty}\right)$$

$$= \lim_{x\to\infty}\frac{4}{4} = \frac{4}{4} = 1$$

22. $\lim_{x\to 0^+}\dfrac{\sqrt{x}}{\ln(x+1)}$ $\left(\text{type } \frac{0}{0}\right)$

$$= \lim_{x\to 0^+}\frac{\left[\frac{1}{2\sqrt{x}}\right]}{\left[\frac{1}{x+1}\right]}$$

$$= \lim_{x\to 0^+}\frac{x+1}{2\sqrt{x}} = \infty$$

23. $\lim_{x\to\infty}\dfrac{e^{4x}}{e^{3x}+x}$ $\left(\text{type } \frac{\infty}{\infty}\right)$

$$= \lim_{x\to\infty}\frac{4e^{4x}}{3e^{3x}+1} \quad \left(\text{type } \tfrac{\infty}{\infty}\right)$$

$$= \lim_{x\to\infty}\frac{16e^{4x}}{9e^{3x}} = \lim_{x\to\infty}\frac{16e^{x}}{9} = \infty$$

24. $\lim_{x\to 0}\dfrac{e^{2x}-1}{e^{5x}-1}$ $\left(\text{type } \frac{0}{0}\right)$

$$= \lim_{x\to 0}\frac{2e^{2x}}{5e^{5x}} = \lim_{x\to 0}\frac{2}{5e^{3x}} = \frac{2}{5}$$

25. lir

=

=

=

26. lin

=

=

=

27. lim

=

=

=

28. lim

=

=

=

**29.** $\lim_{x\to 0^+}\left(\frac{1}{x}\right.$

$= \lim_{x\to 0^+}$

$= \lim_{x\to 0^+}$

$= \lim_{x\to 0^+}$

$= \lim_{x\to 0^+}$

$= \lim_{x\to 0^+}$

**30.** $\lim_{x\to\infty}\left(\sqrt{x}\right.$

$= \lim_{x\to\infty}$ v