King Saud University

College of Sciences

Department of Mathematics

106 Math   Exercises

(14)

INDETERMINATE FORMS

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Types of indeterminate forms:

1) $\frac{0}{0}$ or $\frac{\infty}{\infty}$ (Apply L'Hopital's rule)

2) $\infty - \infty$

3) $0 \, \infty$

4) $0^0 , 1^\infty , \infty^0$

Q. Find the following limits , if it is exists :

1)

$$\lim_{x \to 1} \frac{\sqrt{x} - 1}{lnx}$$

2)

$$\lim_{x \to 0} \frac{sinx - x}{tanx - x}$$

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3)

$$\lim_{x \to 0} \frac{sinx\sqrt{1 - sinx}}{x}$$

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4)

$$\lim_{x \to 0} \frac{x - sinx}{x^2}$$

5)

$$\lim_{x \to 0} \frac{x + 1 - e^x}{x^2}$$

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6)

$$\lim_{x \to 0} \frac{\int_0^x \sqrt{1 + sint} \ dt}{x}$$

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7)

$$\lim_{x \to 0} \frac{tanx - x}{x^3}$$

8)

$$\lim_{x \to 1} \frac{\tan^{-1}x - \frac{\pi}{4}}{x - 1}$$

9)

$$\lim_{x \to 0} \frac{x - \tan^{-1}x}{x \sin x}$$

10)

$$\lim_{x \to \infty} \frac{x^2}{\ln x}$$

11)

$$\lim_{x \to \infty} \frac{x^3}{e^x}$$

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12)

$$\lim_{x \to \infty} \frac{x + \cosh x}{x^2 + 1}$$

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13)

$$\lim_{x \to \infty} \frac{x \ln x}{x + \ln x}$$

14)

$$\lim_{x \to \infty} \frac{e^{3x}}{\ln x}$$

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15)

$$\lim_{x \to \infty} \frac{\ln x}{x^3}$$

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16)

$$\lim_{x \to \infty} \frac{x + e^x}{1 + e^{3x}}$$

17)

$$\lim_{x \to (\frac{\pi}{2})^-} \frac{2 - secx}{3tanx}$$

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18)

$$\lim_{x \to 1^+} \left(\frac{1}{x-1} - \frac{1}{lnx} \right)$$

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19)

$$\lim_{x \to 0^-} \left(\frac{1}{x} - \frac{1}{sinx} \right)$$

20)

$$\lim_{x \to 1^+} \left(\frac{3}{lnx} - \frac{2}{x-1} \right)$$

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21)

$$\lim_{x \to \infty} e^{-x} lnx$$

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22)

$$\lim_{x \to \infty} (x^2 - 1) e^{-x^2}$$

23)

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

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24)

$$\lim_{x \to \infty} (1 + \frac{1}{x})^{5x}$$

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25)

$$\lim_{x \to \infty} (1 + \frac{17}{x})^{x}$$

26)

$$\lim_{x \to \infty} (1 + e^{2x})^{\frac{1}{x}}$$

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27)

$$\lim_{x \to 0^+} (3x + e^{2x})^{\frac{1}{x}}$$

28)

$$\lim_{x \to \infty} x^{\frac{1}{x}}$$

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29)

$$\lim_{x \to \infty} (1 + e^x)^{e^{-x}}$$

30)

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

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31)

$$\lim_{x\to 0^+}(e^x-1)^x$$

32)

$$\lim_{x\to 0^+}(2x+1)^{cotx}$$

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33)

$$\lim_{x\to\infty}(1+4x)^{\frac{1}{x^2}}$$

34)

$$\lim_{x \to 0^+} (secx + tanx)^{cscx}$$

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35)

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