Textbook: **Multivariable Calculus:
Concepts and Contexts**, Fourth Edition
by James Stewart

2 Home Work: Limits and continuity

Due Date: **Bhadra 14, 2080**

Exercises 11.2

5-8, 23, 24,27, 29, 31

1. Use the definition of the limit of a function of two variables to verify the limit.

   (a) $\displaystyle\lim_{(x,y)\to(1,0)} x = 1$

   (b) $\displaystyle\lim_{(x,y)\to(1,-3)} y = -3$

   (c) $\displaystyle\lim_{(x,y)\to(a,b)} y = b$

2. Use limit laws to evaluate the limit.

   (a) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{4x-y}{\sin y - 1}$

   (b) $\displaystyle\lim_{(x,y)\to(-1,2)} \frac{xy^3}{x+y}$

   (c) $\displaystyle\lim_{(x,y)\to(4,-2)} x\sqrt{y^3 + 2x}$

3. Investigate whether the limit exists or not.

   (a) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{x^2 y}{x^4 + y^2}$

(b) $\displaystyle\lim_{(x,y)\to(0,0)}\frac{x^3y}{2x^6+y^2}$

(c) $\displaystyle\lim_{(x,y)\to(0,0)}\frac{x+y}{x^2+y}$

(d) $\displaystyle\lim_{(x,y)\to(0,0)}\frac{x}{x^2-y^2}$

4. Discuss the continuity of the function.

(a) $f(x,y) = \begin{cases} \dfrac{x^2+2xy+y^2}{x^2+y^2}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$

(b) $f(x,y) = \begin{cases} \dfrac{\sin xy}{xy}, & xy \neq 0 \\ 1, & xy = 0 \end{cases}$