1. $f(x,y) = x + yx^3 \quad , (2,2), (-1,4)$

$f(2,2) = 2 + 2^4$

$= 18$

$f(-1,4) = -1 - 4$

$= -5$

2. $h(x,y,z) = xyz^{-2}$

$= \frac{xy}{z^2}$

$h(3,8,2) = \frac{3 \times \cancel{8}^{2}}{\cancel{4}\,1} = 6$

$h(3,-2,-6) = \frac{\overset{1}{\cancel{3}} \times -\cancel{2}\,1}{\cancel{36}\ \cancel{12}\ 6}$

$= -1/6$

7) $f(x,y) = \ln(4x^2 - y)$

0

$(1,4)$, $(-1, 4)$

$(4,16)$ $(-4, 16)$

$(-x, 4x)(x, 4x) \notin (x,y)$

$(0,0)$

21) $f(x,y) = 12 - 3x - 4y$

$f(x,y) = x^2 + 4y^2$

14.2

9) $$\lim_{(x,y)\to(2,5)} = g(x,y) - 2(f(x,y))$$

$$= 7 - 2(3)$$
$$= 1$$

11) $$\lim_{(x,y)\to(2,5)} \quad e^{9-7} = \underline{\underline{e^2}}$$

15) $$f(x,y) = \frac{x^3 + y^3}{xy^2}$$

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

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

$$= \frac{1+m^3}{m^2}$$

$\because$ it depends on m, the limit doesn't exist.

21) $$\lim_{(x,y)\to(0,0)} \frac{xy}{3x^2+2y^2}$$

Let $y = cx$

$$\lim_{x\to 0} \frac{cx^2}{3x^2+2c^2x^2}$$

$$\lim_{x\to 0} \frac{c}{3+2c^2}$$

$$= \frac{c}{3+2c^2}$$ the limit doesn't exist

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

At $(0.5, 0.5, 0.5)$

$$= \frac{1.5}{0.75}$$

$$= 2$$

At $(0.1, 0.1, 0.1)$ $= \dfrac{0.3}{0.03}$

$$= 10$$

At $(0.01, 0.01, 0.01)$ $= 100$

27) $\lim\limits_{(z,w)\to(-2,1)} \dfrac{z^4 \cos(\pi w)}{e^{z+w}}$

At $(-2,1)$ $\quad 16\,(-1)\,e$

$= \underline{\underline{-16e}}$

31) $\lim\limits_{(x,y)\to(3,4)} \dfrac{1}{\sqrt{x^2+y^2}}$

$= \dfrac{1}{5}$

35) $\lim\limits_{(x,y)\to(3,-2)} (x^2y^3 + 4xy)$

$9(-8) + 4(6)$

$= -48$