24 $f(x,y) = x^2 - xy + 3y^2$ $(3,-1)$ to $(2.96, -0.95)$

$f(3,-1) = 15$
$f(2.96,-.95) = 14.2811$
$\Delta z = -.7189$

$f_x = 2x - y$ $f_y = 6y - x$
$f_x(3,-1) = 7$ $f_y(3,-1) = -9$

$dz = f_x\,dx + f_y\,dy = 7(x - x_0) - 9(y - y_0)$
$= 7(-.04) - 9(+.05) = -.73$

$dz = -.73$
$\Delta z = -.7189$

30. $P = 8.31\,T/V$

$dP = \frac{dP}{dT}dT + \frac{dP}{dV}dV$

$= \frac{8.31}{V}\,dT + \left(-\frac{8.31\,T}{V^2}\right)dV$

$dT = 305 - 310 = -5$
$dV = 12.3 - 12 = .3$

$dP = \frac{8.31}{12}(-5) - \frac{8.31(310)}{(12)^2}(.3)$

$dP = -8.829$