Exam 3
Section 7.1, 7.2

1. Find the domains of the following functions:

a. $g(x,y) = \dfrac{\sqrt{x-y}}{\ln y}$

Dom(g) = {(x,y) | $x \geq y$, $y > 0$, and $y \neq 1$}

b. $h(x,y,z) = \dfrac{\sqrt{x}\ln y}{z}$

Dom(h) = {(x,y,z)) | $x \geq 0$, $y > 0$ and $z \neq 0$}

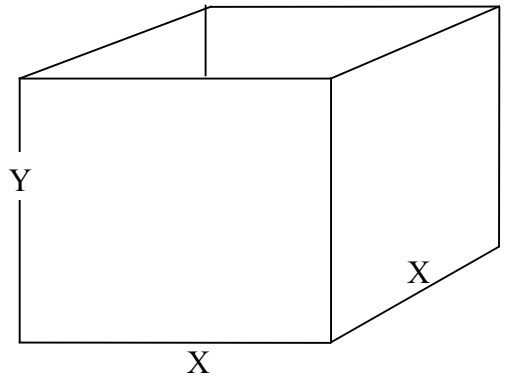
2, Evaluate the given function at the given point:

a. $g(x,y) = \ln(x^3 - y^3)$ at (e, 0)

$g(e,0) = \ln(e^3 - 0^3) = \ln(e^3) = 3$

b. $h(x,y,z) = z\sqrt{x}\ln y$ at (4, e, -1)

$h(4,e,-1) = -\sqrt{4}\ln e = -2$



3. a. Find a function V(x,y) to define the volume of the open-top box shown.

$V(x,y) = x^2y$

b. Find a function S(x,y) to define the surface area of the open-top box shown.

$S(x,y) = x^2 + 4xy$

4. a. Calculate all of the second-order partial derivatives for $f(x,y) = y\ln x + xe^y$.

$f_x = \frac{y}{x} + e^y$ $\quad f_y = \ln x + xe^y$

$f_{xx} = -\frac{y}{x^2}$ $\quad f_{yy} = xe^y$ $\quad f_{xy} = \frac{1}{x} + e^y = f_{yx}$

b. Calculate the second- order partial derivatives for $f(x,y) = x^4y^3 - e^{2x}$.

$f_x = 4x^3y^3 - 2e^{2x}$ $\quad f_y = 3x^4y^2$

$f_{xx} = 12x^2y^3 - 4e^{2x}$ $\quad f_{yy} = 6x^4y$ $\quad f_{xy} = 12x^3y^2 = f_{yx}$