Higher Order Partial Derivatives- HW Problems

Find $\frac{\partial^2 g}{\partial x^2}$, $\frac{\partial^2 g}{\partial x \partial y}$, $\frac{\partial^2 g}{\partial y \partial x}$, and $\frac{\partial^2 g}{\partial y^2}$.

1. $g(x,y) = xln(y) + y^2 e^x + \cos(y)$
2. $g(x,y) = \ln(x^2 + y^2)$

3. Show that $F(x,t) = e^{-3t} cos(x)$ satisfies the partial differential equation $3F_{xx} = F_t$.

4. Show that $f(x,t) = [\sin(x)][\sin(4t)]$ satisfies the partial differential equation $\frac{\partial^2 f}{\partial x^2} = \frac{1}{16}\frac{\partial^2 f}{\partial t^2}$.

5. Let $z = x^2 y - x^4 + y^3$. Find

a. $\frac{\partial^3 z}{\partial x \partial y \partial x}$

b. $\frac{\partial^3 z}{\partial^2 x \partial y}$

c. $\frac{\partial^3 z}{\partial x \partial^2 y}$

d. $\frac{\partial^3 z}{\partial y \partial x \partial y}$

6. Which of the following functions satisfy Laplace's equation $u_{xx} + u_{yy} = 0$?

a. $u(x, y) = \ln(x^2 + y^2)$

b. $u(x, y) = e^y \cos(x)$

c. $u(x, y) = x^2 + y^2$

d. $u(x, y) = 2xy + 3x.$