g) $\ln(xy) = xy^2$

$\ln x + \ln y = xy^2$ (this makes it easier)

$\frac{d}{dx}(\ln x + \ln y) = \frac{d}{dx}(xy^2)$

$\frac{1}{x} + \frac{1}{y}\frac{dy}{dx} = x(2y)\frac{dy}{dx} + y^2$

$\frac{1}{x} - y^2 = 2xy\frac{dy}{dx} - \frac{1}{y}\frac{dy}{dx}$

$\frac{1}{x} - y^2 = \frac{dy}{dx}\left(2xy - \frac{1}{y}\right)$

$$\frac{\frac{1}{x} - y^2}{2xy - \frac{1}{y}} = \frac{dy}{dx}$$ or (simplified) $\frac{dy}{dx} = \frac{y(y^2x - 1)}{x(1 - 2xy^2)}$

17.4

(#1) We know: $A = \pi r^2$ (for circle)

speed of Area increase $= \frac{dA}{dt}$

$\frac{dA}{dt} = \pi(2r)\frac{dr}{dt}$ (remember chain rule)

$\frac{dr}{dt} = 3\frac{ft}{sec}$ radius $= 2ft$

$\frac{dA}{dt} = \pi(2 \cdot 2)\left(3\frac{ft}{sec}\right) = 12\pi\ \frac{ft^2}{sec}$