b) $f(x) = x(2x^3+1)^x + 5$, where $x > 0$

$f'(x) = \frac{d}{dx}\left[x(2x^3+1)^x\right] + \frac{d}{dx}5$ $\to 0$

$f'(x) = \frac{d}{dx}\left[x(2x^3+1)^x\right]$

to find this, use $y_1 = x(2x^3+1)^x$ to find $\frac{dy_1}{dx}$

$\ln y_1 = \ln\left[x(2x^3+1)^x\right] = \ln x + \ln(2x^3+1)^x$

$\ln y_1 = \ln x + x\ln(2x^3+1)$

$\frac{d}{dx}\ln y_1 = \frac{d}{dx}\ln x + \frac{d}{dx}\left[x\ln(2x^3+1)\right]$

$\frac{1}{y_1}\frac{dy_1}{dx} = \frac{1}{x} + x\frac{6x^2}{2x^3+1} + \ln(2x^3+1)$

$\frac{dy_1}{dx} = x(2x^3+1)^x\left[\frac{1}{x} + \frac{6x^3}{2x^3+1} + \ln(2x^3+1)\right]$

$f'(x) = x(2x^3+1)^x\left[\frac{1}{x} + \frac{6x^3}{2x^3+1} + \ln(2x^3+1)\right]$

(6) $y = \frac{f(x)}{g(x)}$

$\ln y = \ln\left(\frac{f(x)}{g(x)}\right) = \ln(f(x)) - \ln(g(x))$

$\frac{d}{dx}\ln y = \frac{d}{dx}\ln(f(x)) - \frac{d}{dx}\ln(g(x))$

$\frac{1}{y}\frac{dy}{dx} = \frac{f'(x)}{f(x)} - \frac{g'(x)}{g(x)}$

$$\boxed{\frac{dy}{dx} = \left(\frac{f'(x)}{f(x)} - \frac{g'(x)}{g(x)}\right)\left(\frac{f(x)}{g(x)}\right)}$$

$$= \frac{g(x)f'(x) - f(x)g'(x)}{f(x)\cdot g(x)}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)f'(x) - f(x)g'(x)}{g^2(x)}$$

Quotient Rule ✓