Ex 1

1. $f'(x) = 2 \times 2x - 8 = 4x - 8$

$g'(x) = -2x + 3$

2. $f'(x) = 3x^2 + 1 \qquad g'(x) = 4x^3 - 6x$

3. $f(x) = u^3 \qquad u = 2x + 1 \qquad u' = 2$

$f'(x) = 3u^2 u' = 3(2x+1)^2 \times 2 = 6(2x+1)^2$

$g(x) = uv \qquad u = x + 2 \qquad u' = 1$

$v = e^x + 1 \qquad v' = e^x$

$g'(x) = u'v + uv' = 1(e^x + 1) + (x+2)e^x = e^x + 1 + xe^x + 2e^x =$

$= xe^x + 3e^x + 1$

4. $f(x) = \frac{u}{v} \qquad u = x - 1 \qquad u' = 1$

$v = x^2 + 4x + 1 \qquad v' = 2x + 4$

$f'(x) = \frac{u'v - uv'}{v^2} = \frac{1(x^2+4x+1) - (x-1)(2x+4)}{(x^2+4x+1)^2} =$

$= \frac{x^2 + 4x + 1 - (2x^2 + 4x - 2x - 4)}{(x^2+4x+1)^2} =$

$= \frac{x^2 + 4x + 1 - 2x^2 - 4x + 2x + 4}{(x^2+4x+1)^2} =$

$$= \frac{-x^2+2x+5}{(x^2+4x+1)^2}$$

$g(x) = \frac{1}{u}$ $\quad u = x^2+1 \quad u' = 2x$

$$g'(x) = -\frac{u'}{u^2} = -\frac{2x}{(x^2+1)^2}$$

5. $f(x) = uv \quad u = 2x^2+x \quad u' = 4x+1$

$v = x^2+1 \quad v' = 2x$

$$f'(x) = u'v + uv' = (4x+1)(x^2+1) + (2x^2+x)(2x) =$$

$$= 4x^3+4x+x^2+1+4x^3+2x^2 =$$

$$= 8x^3+3x^2+4x+1$$

$g(x) = \frac{u}{v} \quad u = 2x \quad u' = 2$

$v = (x^2+2)^2 \quad v' = 2(x^2+2)2x = 4x(x^2+2)$

$$g'(x) = \frac{u'v-uv'}{v^2} = \frac{2(x^2+2)^2 - 2x \times 4x(x^2+2)}{(x^2+2)^4} =$$

$$= \frac{2(x^2+2)^2 - 8x^2(x^2+2)}{(x^2+2)^4} = \frac{2(x^2+2)(x^2+2-4x^2)}{(x^2+2)^4} =$$

$$= \frac{2(x^2+2)(-3x^2+2)}{(x^2+2)^4} = \frac{2(-3x^2+2)}{(x^2+2)^3}$$