26. 7e Mathe HÜ am 2.12.22 $v = a \cdot b + n$

$v = a + b$

4.128)

a) $z = \dfrac{a \cdot b + r}{a + b}$ $\dfrac{dz}{da} =$; $\dfrac{dz}{db}$; $\dfrac{dz}{dr} = \dfrac{?}{?}$

$\dfrac{dz}{da} = \dfrac{ab + b^2 - (ab + r)}{(a+b)^2} = \dfrac{b^2 + r}{(a+b)^2}$ $\dfrac{dz}{db} = \dfrac{a^2 + ab - ab - r}{(a+b)^2} = \dfrac{a^2 - r}{(a+b)^2}$

$\dfrac{dz}{dr} = \dfrac{1}{(a+b)^2}$

4.134 b,c)   b) $f(x) = (5x^2 - 2)^3$ c) $f(x) = (3x^7 - x)^4$; $f'(x) = 4 \cdot (3x^7 - x)^3 \cdot (21x^6 - 1)$

$f'(x) = 3(5x^2 - 2)^2 \cdot 10x$ $f'(x) = 4(27x^{21} - 9x^{15} - 9x^{15} - 9x^9 - x^3)\cdot(21x^6 - 1)$

$f'(x) = (75x^4 - 60x^2 - 12)\cdot 10x$ $f'(x) = (108x^{21} - 36x^{15} - 36x^9 - 4x^3)(21x^6 - 1)$

$f'(x) = (750x^4 - 600x^2 - 120x)$ $f'(x) = 2268x^{27} - 756x^{21} - 756x^{15} - 84x^9$

$\qquad\qquad - 108x^{21} + 36x^{15} + 36x^9 + 4x^3$

$f'(x) = 2268x^{27} + 864x^{21} - 2376x^{21} - 120x^9 + 4$

4.140 a,b)   a) $f(x) = \sqrt{1-x}$

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

$f'(x) = \frac{1}{2}\cdot(1-x)^{-\frac{1}{2}} \cdot -1 = f'(x) = \dfrac{-1}{2\sqrt{1-x}}$ b) $f(x) = \sqrt[3]{2x - 3x^8}$

$f(x) = (2x - 3x^8)^{\frac{1}{3}} =$

$f'(x) = \dfrac{2 - 24x^7}{3\sqrt[3]{2x - 3x^8}}$

4.144 a-c) $f(x) = \cos(e^x)$ $f'(x) = -\sin(e^x)\cdot e^x$

a)
b) $f(x) = \sin(3^x)$ $f'(x) = \cos(3^x)\cdot \ln(3)\cdot 3^x$ c) $f(x) = \cos(\ln(x))$

$3^x = \ln(3)\cdot 3^x$ $f'(x) = \dfrac{\sin(\ln(x))\cdot 1}{x}$

4.1262 a) $f(t) = \dfrac{3(t^2 + 3t)^2}{(t+1)}$ $u = (t^2 + 3t)^2$ $u' = (2t + 6t)\cdot(2t + 3)$

$f'(t) = \dfrac{4t^3 + 18t^2 + 18t \cdot (t+1) - (t^4 + 6t^3 + 9t^2)}{(t+1)^2}$ $v = (t+1)$ $u' = 4t^3 + 18t^2 + 18t$

$\qquad\qquad v' = 1$ $u = (t^4 + 6t^3 + 9t^2)$

$f'(t) = \dfrac{4t^4 + 4t^3 + 18t^3 + 18t^2 + 18t^2 + 18t - (t^4 + 6t^3 + 9t^2)}{(t+1)^2}$

$f'(t) = \dfrac{3t^4 + 16t^3 + 27t^2 + 18t}{(x+1)^2}$

4-162 a)

$$u = 3t^2 \qquad u' = 6t$$

$$f(t) = \frac{\cdot 3t^2}{(t+3)^3} \qquad v = (t+3)^3 \qquad v' = 3(t+3)^2 \cdot 1$$

$$f(t) = \frac{6t(t+3)^3 - 3(t+3)^2 \cdot 3t^2}{((t+3)^3)^2} = \frac{(t+3)^2 \left(6t \cdot (t+3) - 9t^2\right)}{(t+3)^6}$$

$$f'(t) = \frac{6t^2 + 18t - 9t^2}{(t+3)^4} = \frac{6 - 3t^2 + 18t}{(t+3)^4}$$