15.12 1)

$$\left(\frac{(x^2+x)\sigma\upsilon\nu x}{1-\eta\mu x}\right)'=\frac{\left[(x^2+x)\sigma\upsilon\nu x\right]'(1-\eta\mu x)-(x^2+x)\sigma\upsilon\nu x(1-\eta\mu x)'}{(1-\eta\mu x)^2}=$$

$$=\frac{\left[(x^2+x)'\sigma\upsilon\nu x+(x^2+x)(\sigma\upsilon\nu x)'\right](1-\eta\mu x)-(x^2+x)\sigma\upsilon\nu x(-\sigma\upsilon\nu x)}{(1-\eta\mu x)^2}$$

$$=\frac{\left[(2x+1)\sigma\upsilon\nu x-(x^2+x)\eta\mu x\right](1-\eta\mu x)+(x^2+x)\sigma\upsilon\nu^2 x}{(1-\eta\mu x)^2}$$

15.12 2)

$$\left(\frac{x^2(x+1)}{x^2+1}\right)'=\frac{\left[x^2(x+1)\right]'(x^2+1)-x^2(x+1)(x^2+1)'}{(x^2+1)^2}=$$

$$\frac{\left[2x(x+1)+x^2\right](x^2+1)-2x^3(x+1)}{(x^2+1)^2}=\frac{(3x^2+2x)(x^2+1)-2x^4-2x^3}{(x^2+1)^2}=$$

$$=\frac{(3x^2+2x)(x^2+1)-2x^4-2x^3}{(x^2+1)^2}=\frac{3x^4+3x^2+\cancel{2x^3}+2x-2x^4-\cancel{2x^3}}{(x^2+1)^2}=\frac{x^4+3x^2+2x}{(x^2+1)^2}$$

15.12 3)

$$\left(\frac{x\cdot 5^x}{x+1}\right)'=\frac{(x\cdot 5^x)'(x+1)-x\cdot 5^x(x+1)'}{(x+1)^2}=\frac{(5^x+x\cdot 5^x\ln 5)(x+1)-x\cdot 5^x}{(x+1)^2}=$$

$$=\frac{(5^x+x\cdot 5^x\ln 5)(x+1)-x\cdot 5^x}{(x+1)^2}=\frac{\cancel{x\cdot 5^x}+5^x+x^2\cdot 5^x\ln 5+x\cdot 5^x\ln 5-\cancel{x\cdot 5^x}}{(x+1)^2}=$$

$$=\frac{5^x+x^2\cdot 5^x\ln 5+x\cdot 5^x\ln 5}{(x+1)^2}=$$

15.12 4)

$$\left(\frac{x\eta\mu x}{1+\varepsilon\varphi x}\right)'=\frac{(x\eta\mu x)'(1+\varepsilon\varphi x)-x\eta\mu x(1+\varepsilon\varphi x)'}{(1+\varepsilon\varphi x)^2}=\frac{(\eta\mu x+x\sigma\upsilon\nu x)(1+\varepsilon\varphi x)-\frac{x\eta\mu x}{\sigma\upsilon\nu^2 x}}{(1+\varepsilon\varphi x)^2}$$

15.12 5)

$$\left(\frac{6x^2\ln x}{4x^2+3}\right)'=\frac{(6x^2\ln x)'(4x^2+3)-6x^2\ln x(4x^2+3)'}{(4x^2+3)^2}=$$

$$=\frac{(12x\ln x+6x)(4x^2+3)-48x^3\ln x}{(4x^2+3)^2}=\frac{\cancel{48x^3\ln x}+36x\ln x+24x^3+18x-\cancel{48x^3\ln x}}{(4x^2+3)^2}=$$

$$=\frac{36x\ln x+24x^3+18x}{(4x^2+3)^2}$$

15.12 6)

$$\left(\frac{8x-5}{4x\sqrt{x}}\right)'=\frac{(8x-5)'(4x\sqrt{x})-(8x-5)(4x\sqrt{x})'}{(4x\sqrt{x})^2}=\frac{32x\sqrt{x}-(8x-5)\left(4\sqrt{x}+\frac{2x}{\sqrt{x}}\right)}{16x^3}$$

15.12 7)

$$\left(\frac{2\ln x}{e^x(x^2+5)}\right)'=\frac{(2\ln x)'e^x(x^2+5)-2\ln x\left[e^x(x^2+5)\right]'}{\left[e^x(x^2+5)\right]^2}=$$

$$=\frac{\frac{2e^x(x^2+5)}{x}-2\ln x\left[e^x(x^2+5)+2xe^x\right]}{\left[e^x(x^2+5)\right]^2}$$

15.12 8)

$$\left(\frac{2x\etaμx}{1-συνx}\right)'=\frac{(2xημx)'(1-συνx)-2xημx(1-συνx)'}{(1-συνx)^2}=$$

$$=\frac{(2ημx+2xσυνx)(1-συνx)-2xημ^2x}{(1-συνx)^2}$$

15.12 9)

$$\left(\frac{2x^2+5}{3xημx}\right)'=\frac{(2x^2+5)'(3xημx)-(2x^2+5)(3xημx)'}{(3xημx)^2}=$$

$$=\frac{12x^2ημx-(2x^2+5)(3ημx+3xσυνx)}{9x^2ημ^2x}$$

15.12 10)

$$\left(\frac{2x-5}{e^x(x^2+4)}\right)'=\frac{(2x-5)'e^x(x^2+4)-(2x-5)\left[e^x(x^2+4)\right]'}{\left[e^x(x^2+4)\right]^2}=$$

$$=\frac{2e^x(x^2+4)-(2x-5)\left[e^x(x^2+4)+2xe^x\right]}{e^{2x}(x^2+4)^2}$$

15.12 11)

$$\left(\frac{5\sqrt{x}}{e^x(x^2+σφx)}\right)'=\frac{(5\sqrt{x})'e^x(x^2+σφx)-5\sqrt{x}\left[e^x(x^2+σφx)\right]'}{\left[e^x(x^2+σφx)\right]^2}=$$

$$=\frac{\frac{5e^x\left(x^2+\sigma\varphi x\right)}{2\sqrt{x}}-5\sqrt{x}\left[e^x\left(x^2+\sigma\varphi x\right)+e^x\left(2x-\frac{1}{\eta\mu^2 x}\right)\right]}{e^{2x}\left(x^2+\sigma\varphi x\right)^2}$$

15.12 12)

$$\left(\frac{x^3 3^x \eta\mu x}{x^2+7}\right)'=\frac{\left[x^3 3^x \eta\mu x\right]'\left(x^2+7\right)-x^3 3^x \eta\mu x\left(x^2+7\right)'}{\left(x^2+7\right)^2}=$$

$$=\frac{\left(3x^2 3^x \eta\mu x+x^3 3^x \ln 3\eta\mu x+x^3 3^x \sigma\upsilon\nu x\right)\left(x^2+7\right)-2x^4 3^x \eta\mu x}{\left(x^2+7\right)^2}$$