RIEŠENIE - MINITEST 7 - LS 2023/24 - MATEMATIKA A

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9:15 a.) $f_1(x) = \sqrt{2x^5+3x^2}$

FORM. ZDERIVUJTE A ČO NAJVIAC ZJEDNODUŠTE.

b.) $f_2(x) = (x^2-1)(\ln(4x^2+5))$

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a.) $$\left(\sqrt{2x^5+3x^2}\right)' = \left[(2x^5+3x^2)^{\frac{1}{2}}\right]' = \frac{1}{2}(2x^5+3x^2)^{-\frac{1}{2}} \cdot (2\cdot 5x^4 + 3\cdot 2x)$$

$$= \frac{x\cdot(5x^3+3)}{\sqrt{2x^5+3x^2}} = \frac{3x}{\sqrt{2x^5+3x^2}} + \frac{5x^4}{\sqrt{2x^5+3x^2}}$$

$$\left(= \frac{10x^4+6x}{2\cdot\sqrt{2x^5+3x^2}} \right)$$

$f'\cdot g + g'\cdot f$

b.) $$\left[(x^2-1)\cdot(\ln(4x^2+5))\right]' = \left((f\cdot g)'\right) = (2x)(\ln(4x^2+5)) + (x^2-1)\frac{1}{4x^2+5}\cdot(8x)$$

$$= 2x\cdot\left(\ln(4x^2+5) + \frac{x^2-1}{4x^2+5}\cdot 4\right) = 2x\left(\ln(4x^2+5) + \frac{8x^3-8x}{4x^2+5}\right.$$

$$= 2x\left(\ln(4x^2+5) + \frac{4(x^2-1)}{4x^2+5}\right) = 2x\ln(4x^2+5) + \frac{8x(x-1)(x+1)}{4x^2+5}$$

11:00 a.) $f_1(x) = e^{3x^2}\cdot(2x^3+6x)$

b.) $f_2(x) = \frac{\sqrt{x}}{x^2+4}$

a.) $$\left[e^{3x^2}\cdot(2x^3+6x)\right]' = (f\cdot g)' = e^{3x^2}\cdot 6x\cdot(2x^3+6x) + e^{3x^2}\cdot(2\cdot 3x^2+6)$$

$$= e^{3x^2}\cdot 6\cdot\left[x\cdot(2x^3+6x) + (x^2+1)\right]$$

$\sqrt{x} = x^{\frac{1}{2}}$

$$= e^{3x^2}\cdot 6\cdot\left[2x^4+6x^2+x^2+1\right] = e^{3x^2}\cdot 6\cdot\left[2x^4+7x^2+1\right]$$

$$= e^{3x^2}\cdot\left[12x^4+42x^2+6\right]$$

b.) $$\left[\frac{\sqrt{x}}{x^2+4}\right]' = \left[\frac{f}{g}\right]' = \frac{(\sqrt{x})'\cdot(x^2+4) + (\sqrt{x})\cdot(x^2+4)'}{(x^2+4)^2}$$

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

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

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