جلسه هفتم ۲۰/۲/

۵ $$(e^{x})' = e^{x}$$

۶ $$(e^{u})' = u'e^{u}$$

$$(e^{\sin x})' = \cos x \, e^{\sin x}$$

$$(e^{x^{2}})' = 2x \, e^{x^{2}}$$

۷ $$(\ln x)' = \frac{1}{x}$$

۸ $$(\ln u)' = \frac{u'}{u}$$

$$(\ln \bigcirc)' = \frac{\bigcirc'}{\bigcirc}$$

$$(\ln \sin x)' = \frac{\cos x}{\sin x}$$

۹ $$\left(\sqrt[m]{x^{n}}\right)' = \frac{n}{m\sqrt[m]{x^{m-n}}}$$

$$\left(\sqrt[5]{x^{3}}\right)' = \frac{3}{5\sqrt[5]{x^{2}}}$$

۱۰ $$\left(\sqrt[m]{u^{n}}\right)' = \frac{n\,u'}{m\sqrt[m]{u^{m-n}}}$$

$$\left(\sqrt[8]{\sin^{5} x}\right)' = \frac{5\cos x}{8\sqrt[8]{\sin^{3} x}}$$

u

نکته ۵

۱ $$\left(f(x) \pm g(x)\right)' = f'(x) \pm g'(x)$$

$$(x^{2} + \sin x)' = 2x + \cos x$$

۲ $$\left(f(x)\,g(x)\right)' = f'(x)\,g(x) + g'(x)\,f(x)$$

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$$(x^{2} \sin x)' = 2x \sin x + \cos x\,(x^{2})$$

f g f' g $+$ g' f

مشتق صورت ، مخرج − مشتق مخرج ، صورت

۳ $$\left(\frac{f(x)}{g(x)}\right)' = \frac{f'(x)\,g(x) - g'(x)\,f(x)}{g^{2}(x)}$$

$$\left(\frac{\sin x}{x}\right)' = \frac{(\cos x)(x) - (1)\sin x}{x^{2}}$$

۴ $(k\,f(x))' = k\,f'(x)$

$(۷\sin x)' = ۷\cos x$

۵ $(\text{عدد})' = ۰$

$(۷)' = ۰ \qquad (۲)' = ۰$

مثال

$f(x) = ۵x^{۳} - ۹x + ۴$

$f'(x) = ۱۵x^{۲} - ۹ + ۰$

$۵x^{۳} \downarrow ۵(۳x^{۲})$

$f(x) = ۸\sin x - ۲$

$f'(x) = ۸\cos x$

$f(x) = \underset{f}{(۳x-۲)}\underset{g}{(۴x-۵)}$

$f'(x) = ۳(۴x-۵) + ۴(۳x-۲)$

$f'\,g + g'\,f$

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

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

$$f(x) = \operatorname{Ln}(x^{2}-x)$$

$$(\operatorname{Ln} u)' = \frac{u'}{u}$$

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

$$f(x) = e^{5x^{2}+1}$$

$$f'(x) = 10x\, e^{5x^{2}+1}$$

$$f(x) = \underbrace{(2x+1)}_{u}{}^{5}$$

x^{n} u^{n}

x^{5} u^{5}

$$f'(x) = 5\,(2)\,(2x+1)^{4}$$

$n \quad u' \quad u^{n-1}$

$$f(x) = \sqrt[2]{\underbrace{(x^{2}-4x)}_{u}{}^{1}}$$

$n=1$

$m=2$

$$f'(x) = \frac{2x - 4}{2\sqrt{x^2 - 4x}} \qquad \left(\sqrt[m]{u^n}\right)' = \frac{nu'}{m\sqrt[m]{u^{m-n}}}$$

$$f(x) = (7x^3 - 2x + 4)^{20}$$

$$f'(x) = 20(21x^2 - 2)(7x^3 - 2x + 4)^{19}$$

$$n \qquad u' \qquad u^{n-1}$$

$$f(x) = x^2 \sin x - 7x^5 + 3x - 4$$

$$f'(x) = 2x \sin x + \cos x\,(x^2) - 35x^4 + 3$$

$$f(x) = 8e^{2x+3} + 3\ln x - 2\cos x$$

$$f'(x) = 8(2)e^{2x+3} + 3\left(\frac{1}{x}\right) - 2(-\sin x)$$

$$f(x) = 15\sqrt[7]{(8x^2 + 3)^5} + x\ln x$$

$$u$$

$$f'(x) = 15\,\frac{5(16x)}{7\sqrt[7]{(8x^2+3)^2}} + (1)\ln x + \left(\frac{1}{x}\right)x$$

$$f(x) = 12\operatorname{Ln}(3x+8) - x + \frac{1}{\cos x}$$

$$f'(x) = 12\,\frac{3}{3x+8} - 1 + \frac{0-(-\sin x)(1)}{\cos^2 x}$$

$$f(x) = \frac{4x^2 - x}{7x+3} + 5\sin^3 x - 8e^{2\sin x}$$

u

$$f'(x) = \frac{(8x-1)(7x+3) - 7(4x^2 - x)}{(7x+3)^2}$$

$$+\,5(3)\cos x\,\sin^2 x - 8(2)\cos x\, e^{2\sin x}$$