OBLICZYĆ POCHODNE:

1. $y = \frac{1}{x} + 3\sin x + \sqrt{x} - \ln 2$

$y' = -\frac{1}{x^2} + 3\cos x + \frac{1}{2\sqrt{x}}$

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

$(c\cdot f)' = \underbrace{c'}_{=0}f + c\cdot f' = c\cdot f'$

2. $y = \boxed{\frac{7x^{15}}{2+\sqrt{3}}}$ ← stała

$y' = \frac{7}{2+\sqrt{3}}\cdot 15x^{14}$ lub $y' = \frac{(7x^{15})'(2+\sqrt{3}) + 7x^{15}\cdot(2+\sqrt{3})'}{(2+\sqrt{3})^2} = \frac{7\cdot 15x^{14}\cdot(2+\sqrt{3}) + 7x^{15}\cdot 0}{(2+\sqrt{3})^2} = \frac{7\cdot 15x^{14}\cancel{(2+\sqrt{3})}}{(2+\sqrt{3})^{\cancel{2}}} = \frac{7\cdot 15x^{14}}{2+\sqrt{3}}$

3. $y = xe^x$ ILOCZYN!

$y' = 1\cdot e^x + xe^x$

4. $y = (5x^6 + 2x)\cos x$

$y' = (5\cdot 6x^5 + 2)\cos x + (5x^6 + 2x)(-\sin x)$

5. $y = \frac{2x^3}{tg\, x}$

$y' = \frac{6x^2\cdot tg x - 2x^3\cdot\frac{1}{\cos^2 x}}{(tg x)^2}$

$(tg x)^2 = tg^2 x \neq tg x^2$

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

6. $y = \frac{\sqrt[3]{x^5}}{3\arcsin x}$

$y' = \frac{\frac{5}{3}x^{\frac{2}{3}}\cdot 3\arcsin x - \sqrt[3]{x^5}\cdot 3\frac{1}{\sqrt{1-x^2}}}{(3\arcsin x)^2}$

7. $y = e^{\boxed{2x}}$ pochodna

$y' = e^{\boxed{2x}}\cdot 2$

8. $y = \sin\boxed{x^2}$ pochodna

$y' = \cos\boxed{x^2}\cdot 2x$

9. $y = \sin^2 x = (\boxed{\sin x})^2$

$y' = 2\boxed{\sin x}\cdot\cos x$

10. $y = \ln(\boxed{x+10})$

$y' = \frac{1}{\boxed{x+10}}\cdot 1$

11. $y = ctg(5x + e^x)$

$y' = \frac{-1}{\sin^2(5x+e^x)}\cdot(5+e^x)$

12. $y = \sqrt{\ln 2x}$

$y' = \frac{1}{2\sqrt{\ln 2x}}\cdot\frac{1}{2x}\cdot 2$

13. $y = \arccos\left(\frac{1}{x}\right)$

$y' = \frac{-1}{\sqrt{1-\left(\frac{1}{x}\right)^2}}\cdot\left(-\frac{1}{x^2}\right)$

14. $y = \frac{1}{6x^3 + \ln 2x}$

$y' = \frac{-1\left(18x^2 + \frac{1}{2x}\cdot 2\right)}{(6x^3 + \ln 2x)^2}$ lub $y' = \left((6x^3 + \ln 2x)^{-1}\right)' = -1(6x^3 + \ln 2x)^{-2}\left(18x^2 + \frac{1}{2x}\cdot 2\right)$

15. $y = \ln^2(3x+1)$

$y' = 2\ln(3x+1)\cdot\frac{1}{3x+1}\cdot 3$

16. $y = tg\sqrt{x}\cdot e^{x^3}$

$y' = \frac{1}{\cos^2\sqrt{x}}\cdot\frac{1}{2\sqrt{x}}\cdot e^{x^3} + tg\sqrt{x}\, e^{x^3}\cdot 3x^2$

17. $y = 3\ln\frac{x}{\sin 5x}$

$y' = 3\,\frac{1}{\frac{x}{\sin 5x}}\cdot\frac{1\cdot\sin 5x - x\cos 5x\cdot 5}{(\sin 5x)^2}$

$(\sqrt[3]{x})' = (x^{\frac{1}{3}})' = \frac{1}{3}x^{-\frac{2}{3}} = \frac{1}{3\sqrt[3]{x^2}}$

18. $y = \cos\left(\sqrt[3]{x} + \frac{1}{x}\right)\cos\frac{\pi}{12}$

$y' = \cos\frac{\pi}{12}\cdot\left(-\sin\left(\sqrt[3]{x} + \frac{1}{x}\right)\right)\cdot\left(\frac{1}{3\sqrt[3]{x^2}} - \frac{1}{x^2}\right)$

$(\log_a x)' = \frac{1}{x\ln a} \Rightarrow (\log x)' = \frac{1}{x\ln 10}$

$\left(\frac{1}{\sqrt[3]{x^5}}\right)' = (x^{-\frac{5}{3}})' = -\frac{5}{3}x^{-\frac{8}{3}}$

19. $y = \frac{\log\left(\frac{1}{\sqrt[3]{x^5}} + 2x\right)}{2^{3x+15}}$

$y' = \frac{\frac{1}{\left(\frac{1}{\sqrt[3]{x^5}} + 2x\right)\ln 10}\cdot\left(-\frac{5}{3}x^{-\frac{8}{3}} + 2\right)\cdot 2^{3x+15} - \log\left(\frac{1}{\sqrt[3]{x^5}} + 2x\right)\cdot 2^{3x+15}\cdot\ln 2\cdot 3}{(2^{3x+15})^2}$

$(a^x)' = a^x\ln a \Rightarrow (2^x)' = 2^x\ln 2$

$(e^x)' = e^x\underbrace{\ln e}_{=1} = e^x$

20. $y = x^x = e^{\ln x^x} = e^{x\ln x}$

$y' = (e^{x\ln x})' = e^{x\ln x}\cdot\left(1\cdot\ln x + x\cdot\frac{1}{x}\right) = x^x(\ln x + 1)$