$$\frac{d}{dx}\frac{f(x)}{g(x)} = \frac{f'(x)\cdot g(x) - f(x)\cdot g'(x)}{(g(x))^2}$$

or $\frac{d}{dx}\frac{hi}{lo} = \frac{lo\ di\ hi - hi\ di\ lo}{lo \cdot lo}$ ← "square below" rhymes with "hi di lo"

$(di\ lo = g'(x))$

$\frac{d}{dx}\frac{\sin(x)}{4x^2+2}$ Let $f(x) = \sin(x)$, then $f'(x) = \cos(x)$

Let $g(x) = 4x^2+2$, then $g'(x) = 8x$

so $$\frac{d}{dx}\frac{\sin(x)}{4x^2+2} = \frac{\cos(x)(4x^2+2) - \sin(x)(8x)}{(4x^2+2)^2}$$

$$\frac{d}{dx}\frac{\cos x}{8x^3+3x} = \frac{-\sin(x)(8x^3+3x) - \cos(x)(24x^2+3)}{(8x^3+3x)^2}$$

$$\frac{d}{dx}\frac{7x^4+10}{\cos x} = \frac{(28x^3)\cos(x) - (7x^4+10)(-\sin(x))}{\cos^2 x}$$

$$\frac{d}{dx}\frac{\sin(x)+1}{\cos(x)} = \frac{\cos x(\cos x) - (\sin(x)+1)(-\sin x)}{\cos^2 x}$$

$$\frac{d}{dx}\frac{x^3+\sqrt{x}}{x^4} = \frac{(3x^2+\frac{1}{2}x^{-1/2})(x^4) - (x^3+\sqrt{x})(4x^3)}{x^8}$$

$$\frac{d}{ds}\frac{4s+3}{\sin(s)+\cos(s)} = \frac{4(\sin s+\cos s) - (4s+3)(\cos s - \sin s)}{(\sin s + \cos s)^2}$$

$$\frac{d}{dr}\frac{r^3+3}{\sqrt{r^3}} = \frac{3r^2(\sqrt{r^3}) - (r^3+3)\frac{3}{2}r^{1/2}}{r^3}$$

$$\frac{d}{dx}\tan(x) = \frac{d}{dr}\frac{\sin(x)}{\cos(x)} = \frac{\cos x\cdot\cos x - \sin(x)(-\sin x)}{(\cos x)^2}$$ (Can you simplify this to get $\sec^2 x$?)

$$\frac{d}{dt}\frac{t^2+\sin t}{\sqrt{t^3}+\cos t} = \frac{(2t+\cos t)(\sqrt{t^3}+\cos t) - (t^2+\sin t)(\frac{3}{2}t^{1/2} - \sin t)}{(\sqrt{t^3}+\cos t)^2}$$

$$\frac{d}{dq}\frac{4\sin(q) - \sqrt{q}}{\sqrt{q^3}+q^{2/3}} = \frac{(4\cos q - \frac{1}{2}q^{-1/2})(\sqrt{q^3}+q^{2/3}) - (4\sin q - \sqrt{q})(\frac{3}{2}q^{1/2}+\frac{2}{3}q^{-1/3})}{(\sqrt{q^3}+q^{2/3})^2}$$

$$\frac{d}{dy}\frac{5y^{-2}+\frac{1}{y}}{3y^2} = \frac{(-10y^{-3} - y^{-2})(3y^2) - (5y^{-2}+\frac{1}{y})(6y)}{9y^4}$$