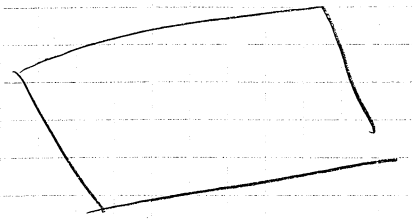
⑤ **Casserole**



Surface S

$$V = \frac{4\pi R^3}{\pi R^2 H}$$

$$\frac{dV}{dR} = H\pi \times 2R$$

$$S = 2\pi RH + \pi R^2 = \pi R(2H + R)$$

$$V = \pi R^2 H$$

$$\frac{dV}{dH} = \pi R^2$$

$$= \frac{S \times R - \pi R^3}{2}$$

$$2\pi RH \times \frac{R}{2}$$

$$V = (S - \pi R^2) \times \frac{R}{2}$$

$$\frac{dV}{dR} = \frac{1}{2}(S - \pi R^2) + (-2\pi R) \times \frac{S - \pi R^2}{2}$$

$u(x) = \frac{R}{2}$ $\quad u(x) = S - \pi R^2$

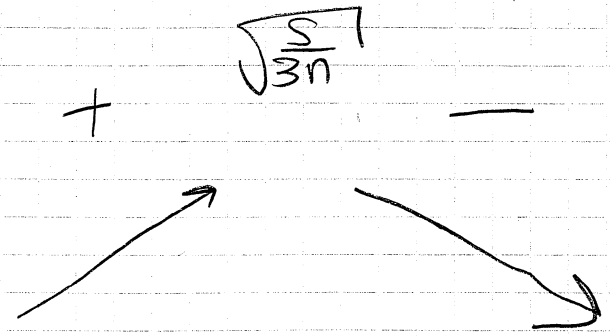
$u'(x) = \frac{1}{2}$ $\quad v'(x) = -2\pi R$

$$= \frac{S}{2} - \frac{\pi R^2}{2} - \pi R^2$$

$$= \frac{S}{2} - \frac{3\pi R^2}{2}$$

$$R = \frac{S}{2} \times \frac{2}{3\pi}$$

$$= \sqrt{\frac{S}{3\pi}}$$



$$V = \frac{S}{3\pi} \times H$$

$$= \frac{SH}{3} =$$

⑥ $\left(P + \frac{a}{V^2}\right)(V - b) = RT$

$$P = \frac{RT}{V-b} - \frac{a}{V^2}$$

$$\frac{\partial P}{\partial T} = \frac{R}{V-b}$$

$$\frac{\partial P}{\partial V} = \frac{-RT}{(V-b)^2} + \frac{2a}{V^3}$$

Exo Dérivat°

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

$f(x) = \tan 2x^2$ $\quad f'(x) = \frac{\sin 2x^2}{\cos 2x^2}$

$u(x) = \sin(2x^2)$ $\quad v(x) = \cos(2x^2)$

$u'(x) = 4x \times \cos(2x^2)$ $\quad v'(x) = 4x \times -\sin(2x^2)$

$$f'(x) = \frac{4x \times \cos^2(2x^2) + 4x \times \sin(2x^2)}{\cos^2(2x^2)}$$

$$= \frac{4x}{\cos^2(2x^2)}$$

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

$-\frac{1}{2} \times -2x \times (1-x^2)^{-3/2}$

$f'(x) =$

$g(x) = e^x - x^2 - x$

$g'(x) = e^x - 2x - 1$

$g''(x) = e^x - 2$

$e^x - 2 = 0$

$e^{\ln 2} - 2 \times \ln 2 - 1$

		$\ln 2$	
$g''(x)$	$-$	0	$+$
$g'(x)$	$+$ ↗	$-$ ↘	$+$ ↗

$f(x) = x^2 + 2x^3$

$f'(x) = 2x + 6x^2$

$f''(x) = 2 + 12x$

$$f(x+h) = (x+h)^2 + 2\times(x+h)^3$$
$$= x^2 + 2xh + h^2 + 2\times(x^3 + 3x^2h + 3xh^2 + h^3)$$
$$= x^2 + 2xh + h^2 + 2x^3 + 6x^2h + 6xh^2 + 2h^3$$
$$= x^2 + 2x^3 + h(2x + 6x^2) + h^2(1 + 6x + 2h)$$
$$= f(x) + h\ f'(x)$$

⑦ $$\rho = \frac{4}{\pi}\frac{m}{hD^2}$$

$$\frac{d\rho}{dm} = \frac{4}{\pi h D^2}$$

$$\frac{d\rho}{dD} = \frac{4m}{\pi h} \times -2\times\frac{1}{D^3}$$

$$\frac{d\rho}{dh} = \frac{4m}{\pi D^2} \times -\frac{1}{h^2}$$

$$\Delta\rho \leq \frac{4}{\pi h D^2}\Delta m + \frac{4m}{\pi h} \times -2 \times \frac{1}{D^3}\Delta D + \frac{4m}{\pi D^2} \times -\frac{1}{h^2} \Delta h$$

$$\frac{\Delta\rho}{\rho} \leq \frac{\Delta m}{m} + \frac{\Delta h}{h} + 2\frac{\Delta D}{D}$$

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① $$g = \frac{g_0 R^2}{(R+z)^2} \qquad g_0 = g_0$$

$$\frac{dg}{dz} = g_0 R^2 \times -2 \times \frac{1}{(R+z)^3}$$

$$g'(0) = g_0\frac{R^2}{R^3} \times -2 = \frac{g_0}{R} \times -2$$

$\sin(x) = x + o(x^1)$

$\sin(x) = x - \frac{x^2}{2!} + o(x^2)$

$\sin(x) = x - \frac{x^3}{3!} + o(x^3)$

$\sin(x) = x - \frac{x^3}{3!} + o(x^4)$

$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} + o(x^5)$

$f(x) = f(0) + x f'(0) + x^2 f''(0) + x^3 f'''(0)$

$= 0 + x + x^2 \times 0 - \frac{x^3}{3!}$

② $\left(P + \frac{a}{V^2}\right)(V-b) = RT$

$V = \frac{RT}{P + \frac{a}{V^2}}$

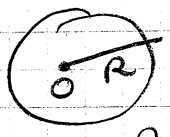
$f(x) = x^5 + 2x^3 + 1 \qquad f'(x) = 5x^4 + 6x^2$

$f(1+h) = (1+h)^5 + 2\times(1+h)^3 + 1 + h f'(1+h)$

$= 4 + h\,11 + o(h)$

$f(1+0{,}02) = 4 + 0{,}02 \times 11$

$f(b) = f(a) + ($



$\int \rho\, dV = \int_0^R \rho_0 \left(1 - \alpha \frac{r^2}{R^2}\right) \times 4\pi r^2 dr$

$= \rho_0 \int_0^R \left(1 - \frac{\alpha r^2}{R^2}\right) 4\pi r^2 dr$

$= \rho_0$

Intégrale

① $W = \int F \cdot dl$

$= \int_0^l kx\, dx$

$= \left[\frac{kx^2}{2}\right]_0^l$

$= \frac{kl^2}{2}$