$V = \pi r^2 \cdot h \Rightarrow \boxed{h = \frac{V}{\pi r^2}}$

$V = 1$

$A = 2\pi r h + 2\pi r^2 = 2\cancel{\pi r}\frac{V}{\cancel{\pi r^2}} + 2\pi r^2$

$$\boxed{A = A(r) = \frac{2}{r} + 2\pi r^2}$$

Find minimum for $A(r)$:

min is $\boxed{\text{critical}}$ pt.

max
min
saddle?

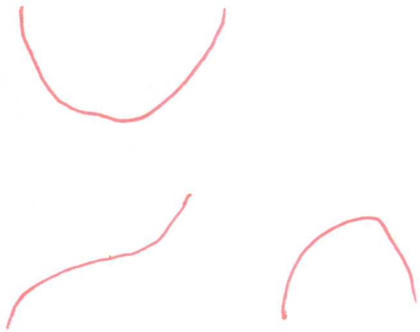
Derivative: $-\frac{2}{r^2} + 4\pi r \overset{!}{=} 0$

$\Rightarrow \cancel{4}_2\,\pi r^3 = \cancel{2}_1 \Rightarrow r = \sqrt[3]{1/\pi}$

Plug in values: $0.1,\ \downarrow,\ 1$

(with calculator)

indeed minimum



Taylor polynomial for $f(x)$ around $a=0$ of degree n:

$$\boxed{\sum_{i=0}^{n} \frac{f^{(i)}(0)}{i!} x^{i}} \quad x \leftarrow (x-a)$$

$$= \frac{f(0)}{1} + \frac{f'(0)}{1}x + \frac{f''(0)}{2}x^2 + \frac{f'''(0)}{6}x^3 + \frac{f^{(4)}(0)}{24}x^4 + \cdots$$

Ex: $f(x) = \underline{\exp(x)}$: $f'(x) = \exp(x), \ldots f^{(i)}(x) = \exp(x)$. $\exp(0) = e^0 = 1$

Taylor poly of deg 4: $\frac{1}{1} + \frac{1}{1}\cdot x + \frac{1}{2}\cdot x^2 + \frac{1}{6}x^3 + \frac{1}{24}x^4$

Ex: $f(x) = \frac{1}{(x+2)} = (x+2)^{-1}$.

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

$f'''(x) = -\frac{6}{(x+2)^4}$

Taylor pol: $\frac{1}{2} - \frac{1}{4}x + \frac{1}{8}x^2 - \frac{1}{16}x^3 + \frac{1}{32}x^4$

Ex: $f(x) = \sin(x)$ $f'(x) = \cos(x)$, $f'' = -\sin(x)$, $f'''(x) = -\cos(x)$

Valuated: 0 1 0 -1

Taylor Pol $0 + \frac{x}{1} - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \frac{x^9}{9!} - \cdots$

$$\boxed{\sum_{i=0}^{n} \frac{f^{(i)}(0)}{i!} x^i}$$

General: The Taylor poly of degree n around a

is $$\boxed{\sum_{i=0}^{n} \frac{f^{(i)}(a)}{i!} (x-a)^i}$$