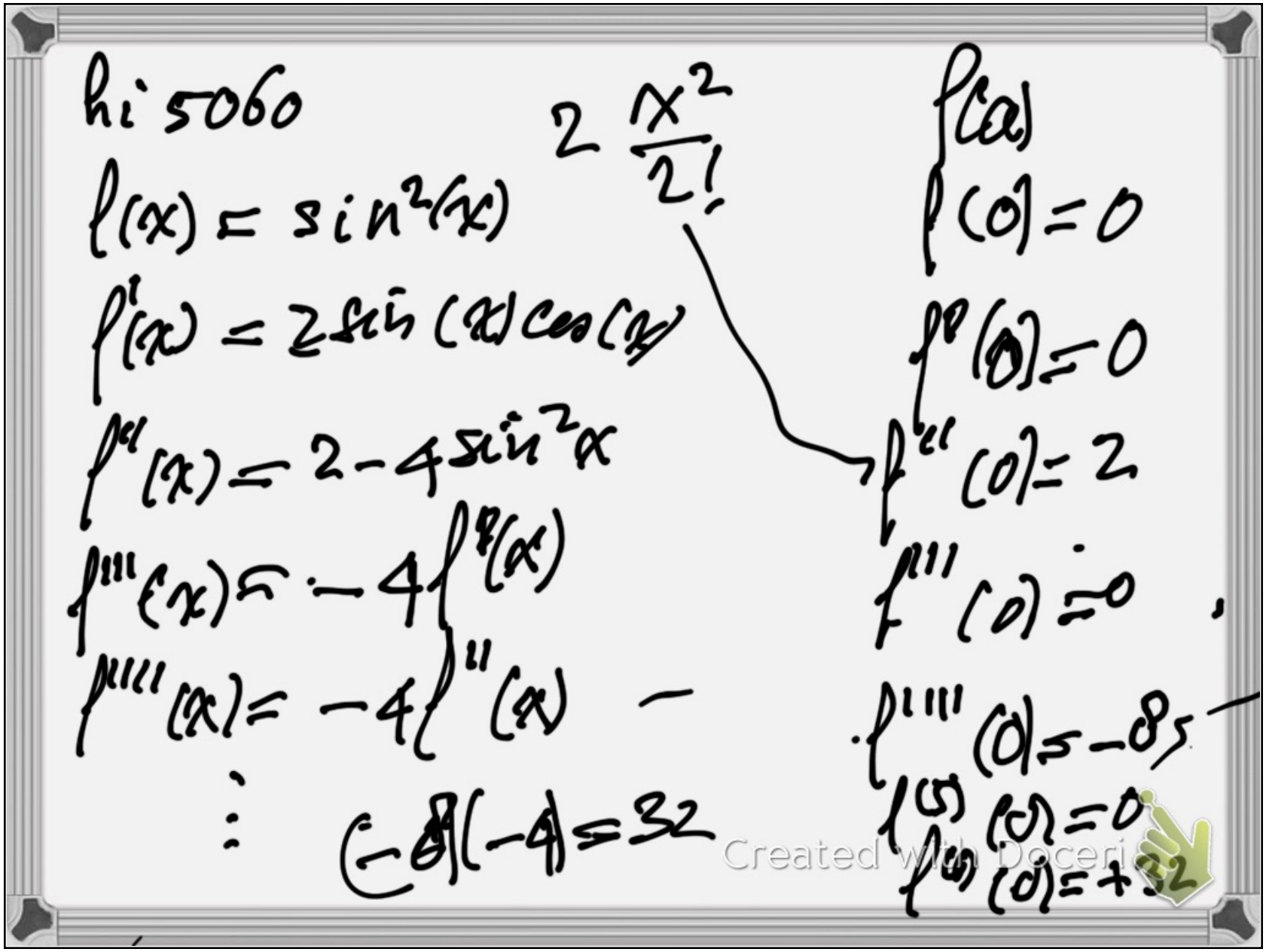
hi 5060
f(x) = sin²(x)
f'(x) = 2 sin(x) cos(x)
f''(x) = 2 − 4 sin²x
f'''(x) = −4 f'(x)
f''''(x) = −4 f''(x)
⋮
(−8)(−4) = 32
2 x²/2!
f(0)
f(0) = 0
f'(0) = 0
f''(0) = 2
f'''(0) = 0
f''''(0) = −8
f⁽⁵⁾(0) = 0
f⁽⁶⁾(0) = +32
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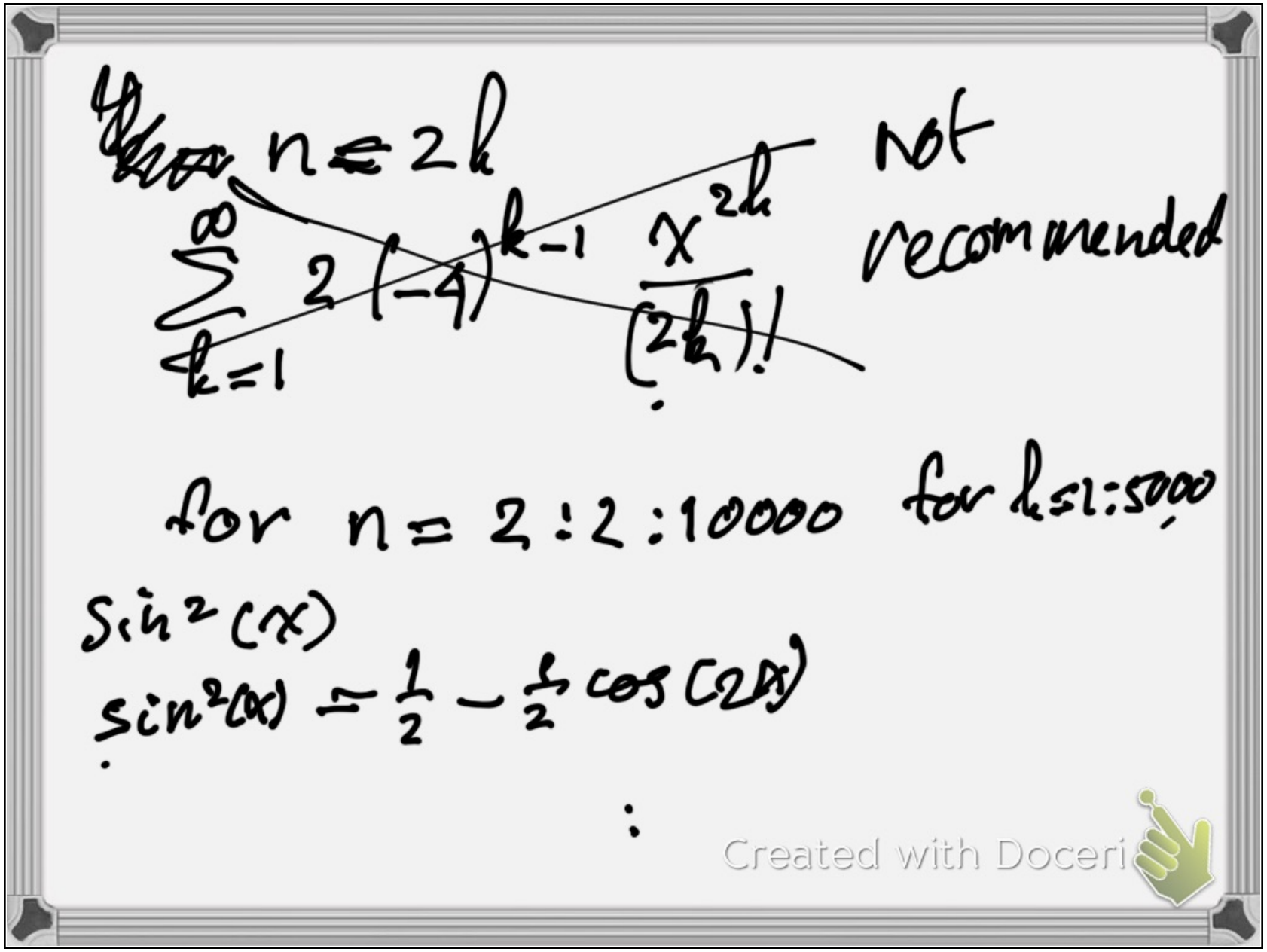
$$f(x) = f(a) + f'(a)\frac{x}{1!} + \cdots$$

$$= \sum_{n=0}^{\infty} f^{(n)}(a)\frac{x^n}{n!}$$

Here, n even $\quad n \geq 2$

$$\sin^2(x) = \sum_{\substack{n=2 \\ n \text{ even}}}^{\infty} 2(-4)^{(n/2)-1}\frac{x^n}{n!}$$

$$= 2\frac{x^2}{2} - 8\frac{x^4}{4!} + 32\frac{x^6}{6!} + \cdots$$


n = 2k
$\sum_{k=1}^{\infty} 2(-4)^{k-1} \frac{x^{2k}}{(2k)!}$
not recommended
for n = 2:2:10000
for k=1:5000
$\sin^2(x)$
$\sin^2(x) = \frac{1}{2} - \frac{1}{2}\cos(2x)$
:
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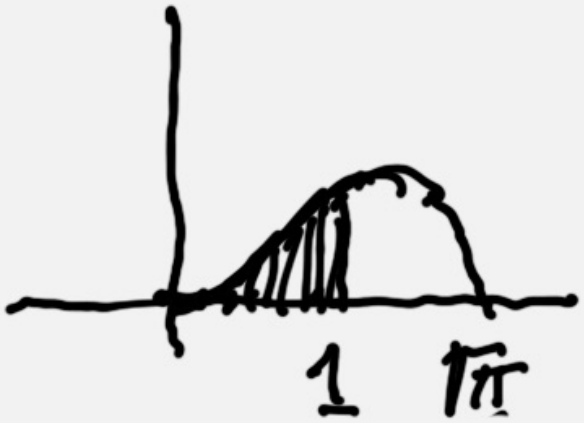
Asked area below $y = \sin(x^2)$

for $0 \leq x \leq 1$

i.e.



$$\int_0^1 \sin(x^2)\,dx$$

$$\sin(u) = u - \frac{u^3}{3!} + \frac{u^5}{5!} - \cdots$$

$$\sin(x^2) = x^2 - \frac{x^6}{3!} + \frac{x^{10}}{5!}$$

$$\int_0^1 \ldots = \left[\frac{x^3}{3} - \frac{x^7}{7\,3!} + \frac{x^{11}}{11\,5!} + \ldots\right]_0^1$$

$$\frac{1}{3} - \frac{1}{7\,3!} + \underbrace{\frac{1}{11\,5!}} + \ldots$$

$$0.3103 \pm 0.0008$$

limits : l'Hopital:

$$\lim_{x=a} \frac{f_1(x)}{f_2(x)} = \frac{f_1'(a)}{f_2'(a)} \text{ or } \frac{f_1(\pm\infty)}{f_2(\pm\infty)}$$

or

$x = \pm\infty$ unless that ratio is

$$\frac{\infty}{\infty} \text{ or } \frac{0}{0}$$

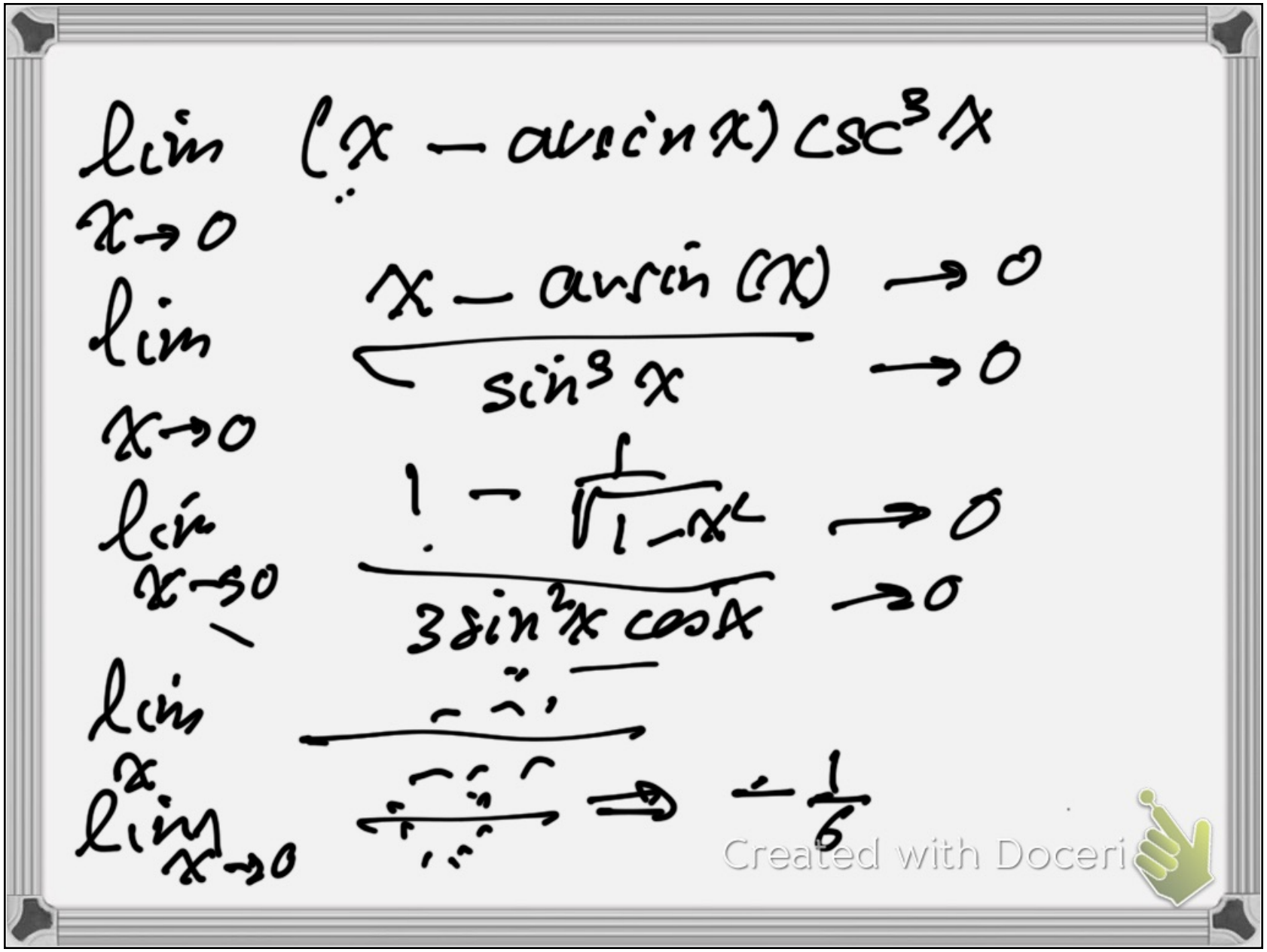
then take the ratio of the derivatives

$$\lim_{x\to} \frac{f_1(x)}{f_2(x)} = \lim_{x\to} \frac{f_1'(x)}{f_2'(x)}$$

$$\lim_{x \to -\infty} x^2 e^x = \lim_{x \to -\infty} \frac{x^2 \to \infty}{e^{-x} \to \infty}$$

$$= \lim \frac{2x \to \infty}{-e^{-x} \to \infty}$$

$$= \lim \frac{2 \to 2}{e^{-x} \to \infty} = 0 = \frac{2}{\infty}$$


lim (x − arcsin x) csc³ x
x→0
lim (x − arcsin(x)) / sin³ x → 0/0
x→0
lim (1 − 1/√(1−x²)) / (3 sin²x cos x) → 0/0
x→0
lim
x
lim → −1/6
x→0
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$$\frac{x - \ln(1+x) + \frac{1}{6}x^3 + \cdots)}{x^3} = \frac{1}{6}$$