

$$(1+x)^k \quad (1+100)^{\frac{1}{2}} \quad x=0$$

⑪ $\frac{4.5}{\sqrt{101}}$

$$y = \sqrt{x} = x^{\frac{1}{2}}$$

$$(100, 10)$$

$$L(x) = f(a) + f'(a)(x-a)$$

$$y' = \frac{1}{2} x^{-\frac{1}{2}}$$

$$L(x) = 10 + \frac{1}{20}(x-100)$$

$$= \frac{1}{2\sqrt{x}}$$

$$L(101) = 10 + \frac{1}{20}(101-100)$$

$$y'(100) = \frac{1}{20}$$

$$= 10\frac{1}{20}$$

$$= 10.05$$

③⑨ ~~$V = \pi r^2 h$~~ $V = \pi r^2 h$

$$\frac{dV}{dr} = 2\pi r h$$

$$dV = 2\pi r h dr$$

(a) $\frac{dV}{dr} = 2\pi a h$

(b) $dV = 2\pi(10)h(.05)$

$$dV = \pi h \text{ cm}^3$$

②⑤ $y + xy - x = 0$

(a) $dy = \frac{1}{(1+x)^2} dx$

$$\frac{y(1+x)}{1+x} = \frac{x}{1+x}$$

(b) $= \frac{1}{(1+0)^2} (.01) = .01$

$$y = \frac{x}{1+x}$$

$$\frac{dy}{dx} = \frac{(1+x) - x}{(1+x)^2}$$

4.5 $\tan^{-1} 4x$

(29) $d(\arctan 4x) = \frac{1}{1+(4x)^2} [4]$

$\frac{d}{dx} \sin x$

$$\frac{dy}{dx} = \frac{4}{1+16x^2}$$

$$dy = \frac{4}{1+16x^2} dx$$

(11) $\sqrt{101}$

$$f(x) = \sqrt{x}$$

$$f(x) = x^{1/2}$$

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

$$= \frac{1}{2\sqrt{x}}$$

$a \quad f(a)$
(100, 10)

$$f'(100) = \frac{1}{2\sqrt{100}} = \frac{1}{20}$$

$$L(x) = 10 + \frac{1}{20}(x-100)$$

$$L(101) = 10 + \frac{1}{20}(101-100)$$

$$= 10 + \frac{1}{20} = 10.05$$

(5) $f(x) = \tan x$, $a = \pi$ (a) $L(x) = 0 + 1(x-\pi)$
 $f(\pi) = \tan \pi = 0$

(b) $L(x) = 0 + 1(\pi + 1 - \pi)$

$$f'(x) = \sec^2 x$$

$$f'(\pi) = \sec^2 \pi = (-1)^2 = 1$$

$$= 1(1)$$

$$= 1$$

(7) $f(x) = (1+x)^k$, $a = 0$ $L(x) = 1 + k(x-0)$

$$f(0) = (1+0)^k = 1$$

$$f'(x) = k(1+x)^{k-1}$$

$$f'(0) = k(1+0)^{k-1} = k$$

$$= 1 + kx$$

$$f(x) = (1 + \text{something})^k$$

4.5
(3) $(1.002)^{100}$

$$(1+x)^k = 1+kx$$

(a) $(1+.002)^{100} \approx 1+100(.002) = 1.2$

\uparrow \uparrow
x k

(b) $\sqrt[3]{1.009}$

$$(1+.009)^{1/3} \approx 1 + \frac{1}{3}(.009) = 1.003$$

$$x^2 - 2x + 1 = \sin x$$

$$x^2 - 2x + 1 - \sin x = 0$$

4.5

(17)

n	x_n	$f(x_n)$	$f'(x_n)$
1	2	.0907	2.4161
2	1.962459	.00205	2.3066
3	1.961570	2.2e-6	2.304

$\frac{f(x_n)}{f'(x_n)}$	$x_n - \frac{f(x_n)}{f'(x_n)}$
.03754	1.962459
.00089	1.961569
.000000965	1.961569