

II $y = \dots$, I (\dots) $x = \dots$ (1).

	(")	()		
$\frac{6}{x}$	$\frac{1}{x}$	6	I	
$\frac{6}{y}$	$\frac{1}{y}$	6	II	
0.25	$\frac{1}{x}$	0.25x	I	
0.25	$\frac{1}{y}$	0.25y	II	
0.3	$\frac{1}{x}$	0.3x	I	

$$\frac{6}{x} + \frac{6}{y} = 1, \quad 6$$

$$0.25x + 0.25y = m, \quad m, \quad " ,$$

$$\begin{cases} \frac{6}{x} + \frac{6}{y} = 1 \\ 0.25x + 0.25y = m \rightarrow x + y = 4m \end{cases}$$

$$\Leftrightarrow \frac{6}{x} + \frac{6}{4m-x} = 1$$

$$24m - 6x + 6x = 4mx - x^2 \rightarrow x^2 - 4mx + 24m = 0$$

$$\Leftrightarrow x_{1,2} = \frac{4m \pm \sqrt{16m^2 - 96m}}{2}$$

$$\Leftrightarrow \boxed{x_{1,2} = 2m \pm 2\sqrt{m^2 - 6m}} \quad m^2 - 6m > 0 \rightarrow m \geq 6 \quad \leftarrow m > 0$$

$$2m \pm 2\sqrt{m^2 - 6m}, m \geq 6 :$$

$$\boxed{m = 6}, \Delta = 0 \quad (2)$$

$$x = 10 \quad 0.3x = 3$$

$$10 = 2m \pm 2\sqrt{m^2 - 6m}$$

$$5 - m = \pm\sqrt{m^2 - 6m}$$

$$25 - 10m + m^2 = m^2 - 6m$$

$$25 = 4m$$

$$m = 6.25$$

$$10 = 2 \cdot 6.25 - 2\sqrt{6.25^2 - 6 \cdot 6.25} \rightarrow 10 = 10 \quad o.k.$$

$$m = 6.25 :$$

"

$$n=1$$

.1.

$$1 \cdot 2 \cdot 3 \cdot 4 = 24 : \quad 2^{-4 \cdot 1} \cdot 2 \cdot 4 \cdot 6 \cdot 8 = \frac{2 \cdot 4 \cdot 6 \cdot 8}{16} = 24 :$$

$$n=1$$

,()

$$n=k$$

.2

$$1 \cdot 2 \cdot 3 \cdot \dots \cdot 4k = 2^{-4k} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k :$$

$$" \quad , n = k + 1$$

.3

$$\frac{1 \cdot 2 \cdot 3 \cdot \dots \cdot 4k \cdot (4k+1) \cdot (4k+2) \cdot (4k+3) \cdot (4k+4) =}{\downarrow}$$

$$2^{-4(k+1)} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k \cdot (8k+2) \cdot (8k+4) \cdot (8k+6) \cdot (8k+8)$$

, , - , ,

$$\Leftrightarrow 2^{-4k} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k \cdot (4k+1) \cdot (4k+2) \cdot (4k+3) \cdot (4k+4) =$$

$$2^{-4k-4} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k \cdot 2 \cdot (4k+1) \cdot 2 \cdot (4k+2) \cdot 2 \cdot (4k+3) \cdot 2 \cdot (4k+4)$$

$$\Leftrightarrow 2^{-4k} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k \cdot (4k+1) \cdot (4k+2) \cdot (4k+3) \cdot (4k+4) =$$

$$\frac{2^{-4k}}{\cancel{16}} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k \cdot \cancel{2} \cdot (4k+1) \cdot \cancel{2} \cdot (4k+2) \cdot \cancel{2} \cdot (4k+3) \cdot \cancel{2} \cdot (4k+4)$$

$$\Leftrightarrow 2^{-4k} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k \cdot (4k+1) \cdot (4k+2) \cdot (4k+3) \cdot (4k+4) =$$

$$2^{-4k} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 8k \cdot (4k+1) \cdot (4k+2) \cdot (4k+3) \cdot (4k+4)$$

$$, n=1$$

.4

$$, n=k$$

$$n=k+1$$

. n , - ,

$$\frac{1 \cdot 3 \cdot 5 \cdot \dots \cdot 199}{202 \cdot 204 \cdot 206 \cdot \dots \cdot 400} = 2^{-b} \quad b$$

-

$$n=50$$

$$1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot \dots \cdot 199 \cdot 200 = 2^{-200} \cdot 2 \cdot 4 \cdot 6 \cdot \dots \cdot 200 \cdot 202 \cdot 204 \cdot 206 \cdot \dots \cdot 400$$

$$\frac{1 \cdot \cancel{2} \cdot 3 \cdot \cancel{4} \cdot 5 \cdot \cancel{6} \cdot \dots \cdot 199 \cdot \cancel{200}}{\cancel{2} \cdot \cancel{4} \cdot \cancel{6} \cdot \dots \cdot \cancel{200} \cdot 202 \cdot 204 \cdot 206 \cdot \dots \cdot 400} = 2^{-200}$$

$$\frac{1 \cdot 3 \cdot 5 \cdot \dots \cdot 199}{202 \cdot 204 \cdot 206 \cdot \dots \cdot 400} = 2^{-200}$$

$$b = 200 :$$

"

$$b > 2, \quad f(x) = \frac{(x-b)^2}{x^2-4} :$$

$$x^2 - 4 \neq 0 \rightarrow x^2 \neq 4 \rightarrow \boxed{x \neq \pm 2} \quad (1)$$

$$y = 1, \quad \lim_{x \rightarrow \infty} \frac{(x-b)^2}{x^2-4} = \lim_{x \rightarrow \infty} \frac{1 - \frac{2b}{x} + \frac{b^2}{x^2}}{1 - \frac{4}{x^2}} = \lim_{x \rightarrow \infty} \frac{1-0+0}{1-0} = 1$$

$$x = 2, x = -2, \quad \lim_{x \rightarrow 2} \frac{(x-b)^2}{x^2-4} = \frac{(2-b)^2}{4-4} = \frac{+}{0^+} = \pm\infty \leftarrow b > 2$$

$$\lim_{x \rightarrow -2} \frac{(x-b)^2}{x^2-4} = \frac{(2-b)^2}{4-4} = \frac{+}{0^+} = \pm\infty \leftarrow b > 2$$

$$x = 2, x = -2, \quad y = 1, x \neq \pm 2 :$$

$$(0, -\frac{b^2}{4}) \quad x = 0 \quad y, \quad (b, 0) : \quad y = 0 \quad x \quad (2)$$

$$(0, -\frac{b^2}{4}), (b, 0) :$$

(3)

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

$$\boxed{f'(x) = \frac{2(x-b)(bx-4)}{(x^2-4)^2}}$$

$$0 = (x-b)(bx-4)$$

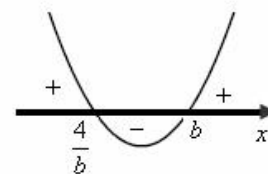
$$x = b \rightarrow (b, 0)$$

$$x = \frac{4}{b} \rightarrow \left(\frac{4}{b}, \frac{4-b^2}{4}\right) f\left(\frac{4}{b}\right) = \frac{\left(\frac{4}{b}-b\right)^2}{\left(\frac{4}{b}\right)^2-4} = \frac{\frac{(4-b^2)^2}{b^2}}{\frac{16-4b^2}{b^2}} = \frac{(4-b^2)^2}{4(4-b^2)} = \frac{4-b^2}{4}$$

פרבולה בעלת מינימום

גרף סימני הנגזרת

$$b > 2 \rightarrow b > \frac{4}{b}$$

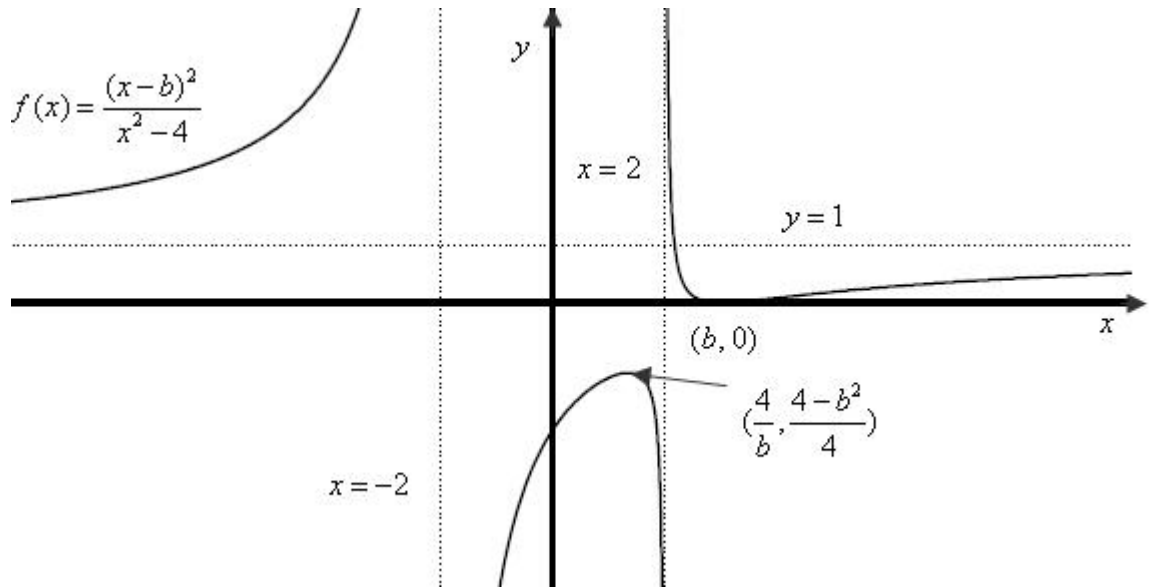


$$x = \frac{4}{b}$$

$$x = b$$

$$\left(\frac{4}{b}, \frac{4-b^2}{4}\right), \quad (b, 0) :$$

$$b > 2$$



$$f''(x)$$

$$f'(x)$$

$$f(x)$$

$$f(x)$$

$$\frac{4}{b} < x < 2$$

$$2 < x < b$$

$$f(x)$$

$$f''(x) < 0$$

$$-2 < x < 2$$

$$f''(x)$$

$$f(x)$$

.(

$$, x > b$$

)

$$\frac{4}{b} < x < 2$$

$$f''(x)$$

—

$$f'(x)$$

$$\frac{4}{b} < x < 2 :$$

$$-3f \leq x \leq 3f \quad f(x) = \frac{2 \cos^2\left(\frac{x}{2}\right) - 1}{2 \cos^2\left(\frac{x}{2}\right)}$$

$$f(-x) = \frac{2 \cos^2\left(-\frac{x}{2}\right) - 1}{2 \cos^2\left(-\frac{x}{2}\right)} = \frac{2 \cos^2\left(\frac{x}{2}\right) - 1}{2 \cos^2\left(\frac{x}{2}\right)} = f(x)$$

$$2 \cos^2\left(\frac{x}{2}\right) \neq 0 \rightarrow \cos\left(\frac{x}{2}\right) \neq 0 \rightarrow \frac{x}{2} \neq \frac{f}{2} + f k \rightarrow \boxed{x \neq f + 2f k}$$

$$(k = 0, 1, -1, -2) \quad x = -3f, \quad x = -f, \quad x = f, \quad x = 3f :$$

$$f(x) = \frac{2 \cos^2\left(\frac{x}{2}\right) - 1}{2 \cos^2\left(\frac{x}{2}\right)} = 1 - \frac{1}{2 \cos^2\left(\frac{x}{2}\right)} = 1 - \frac{1}{\cos x + 1}$$

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

$$0 = \sin x \rightarrow x = f k \rightarrow k = -2, 0, 2 \rightarrow x = -2f, 0, 2f$$

$$f''(x) = -\cos x \rightarrow f''(-2f) = -1 < 0, f''(0) = -1 < 0 \rightarrow \text{Max}$$

$$f(-2f) = f(2f) = 1 - \frac{1}{\cos 2f + 1} = 0.5, \quad f(0) = 1 - \frac{1}{\cos 0 + 1} = 0.5$$

$$x = 2f$$

$$f'(x) = 0 - f'(x),$$

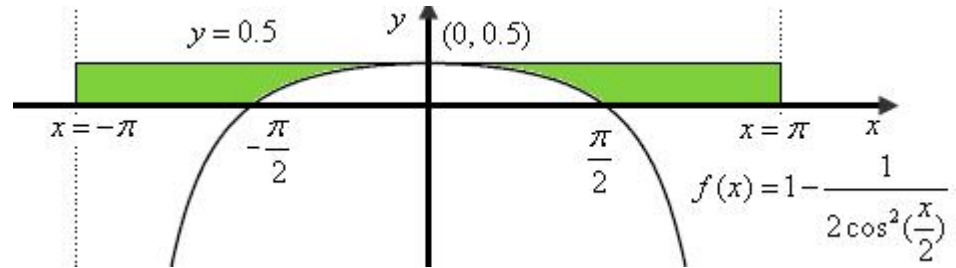
$$(-2f, 0.5), (0, 0.5), (2f, 0.5) :$$

$$f(x) = 1 - \frac{1}{2 \cos^2\left(\frac{x}{2}\right)}$$

$$y = 0.5$$

$$x = \frac{f}{2} + f k \quad \cos x = 0 \quad x =$$

$$x = \frac{f}{2}, x = -\frac{f}{2} \quad k = 0, -1$$



$$S_{\text{GREEN}} = S_{\text{MALBEN}} - S_{\text{WHITE}} :$$

$$S_{\text{MALBEN}} = 2f \cdot 0.5 = f$$

$$S_{\text{WHITE}} = \int_{-\frac{f}{2}}^{\frac{f}{2}} \left(1 - \frac{1}{2 \cos^2\left(\frac{x}{2}\right)} - 0\right) dx$$

$$S_{\text{WHITE}} = \left(x - \frac{0.5}{0.5} \tan \frac{x}{2} \right) \Bigg|_{-\frac{f}{2}}^{\frac{f}{2}}$$

$$S_{\text{WHITE}} = \left(\frac{f}{2} - \tan \frac{f}{4}\right) - \left(-\frac{f}{2} - \tan \frac{-f}{4}\right)$$

$$S_{\text{WHITE}} = \left(\frac{f}{2} - 1\right) - \left(-\frac{f}{2} + 1\right)$$

$$\boxed{S_1 = f - 2}$$

$$S_{\text{GREEN}} = f - (f - 2) = 2$$

" 2 :



אסימטות

$(R < 2.5)$

$$H = \sqrt{25 - 4R^2}$$

$$f(x) = 3p \cdot f R^2 + p \cdot 2f R \sqrt{25 - 4R^2}$$

$$f'(x) = pf (6R + 2\sqrt{25 - 4R^2} - \frac{16R^2}{2\sqrt{25 - 4R^2}})$$

$$f'(x) = pf \frac{(6R\sqrt{25 - 4R^2} + 2(25 - 4R^2) - 8R^2)}{\sqrt{25 - 4R^2}}$$

$$f'(x) = 2pf \cdot \frac{3R\sqrt{25 - 4R^2} + 25 - 8R^2}{\sqrt{25 - 4R^2}}$$

$$0 = 3R\sqrt{25 - 4R^2} + 25 - 8R^2$$

$$25 - 8R^2 = 3R\sqrt{25 - 4R^2}$$

$$625 - 400R^2 + 64R^4 = 9R^2(25 - 4R^2)$$

$$100R^4 - 625R^2 + 625 = 0$$

$$(R^2_{1,2}) = \frac{625 \pm 375}{200} \rightarrow R^2 = 5, R^2 = 1.25 \rightarrow R = \sqrt{5}, R = \sqrt{1.25}$$

$$f'(1) = 3 \cdot 1 \cdot \sqrt{25 - 4 \cdot 1^2} + 25 - 8 \cdot 1^2 = 30.7 > 0$$

$$f'(2) = 3 \cdot 2 \cdot \sqrt{25 - 4 \cdot 2^2} + 25 - 8 \cdot 2^2 = 11 > 0$$

$$f'(2.4) = 3 \cdot 2.4 \cdot \sqrt{25 - 4 \cdot 2.4^2} + 25 - 8 \cdot 2.4^2 = -11 < 0$$

0	1	$\sqrt{1.25}$	2	$\sqrt{5}$	2.4	2.5	R
	+	0	+	0	-		$f'(R)$
	↘		↘	Max	↘		

$$R = \sqrt{5}$$

$$f(\sqrt{5})^2 = 5f$$

, " 5f :