

المحاضرة الخامسة

تمارين الدوال المثلثية

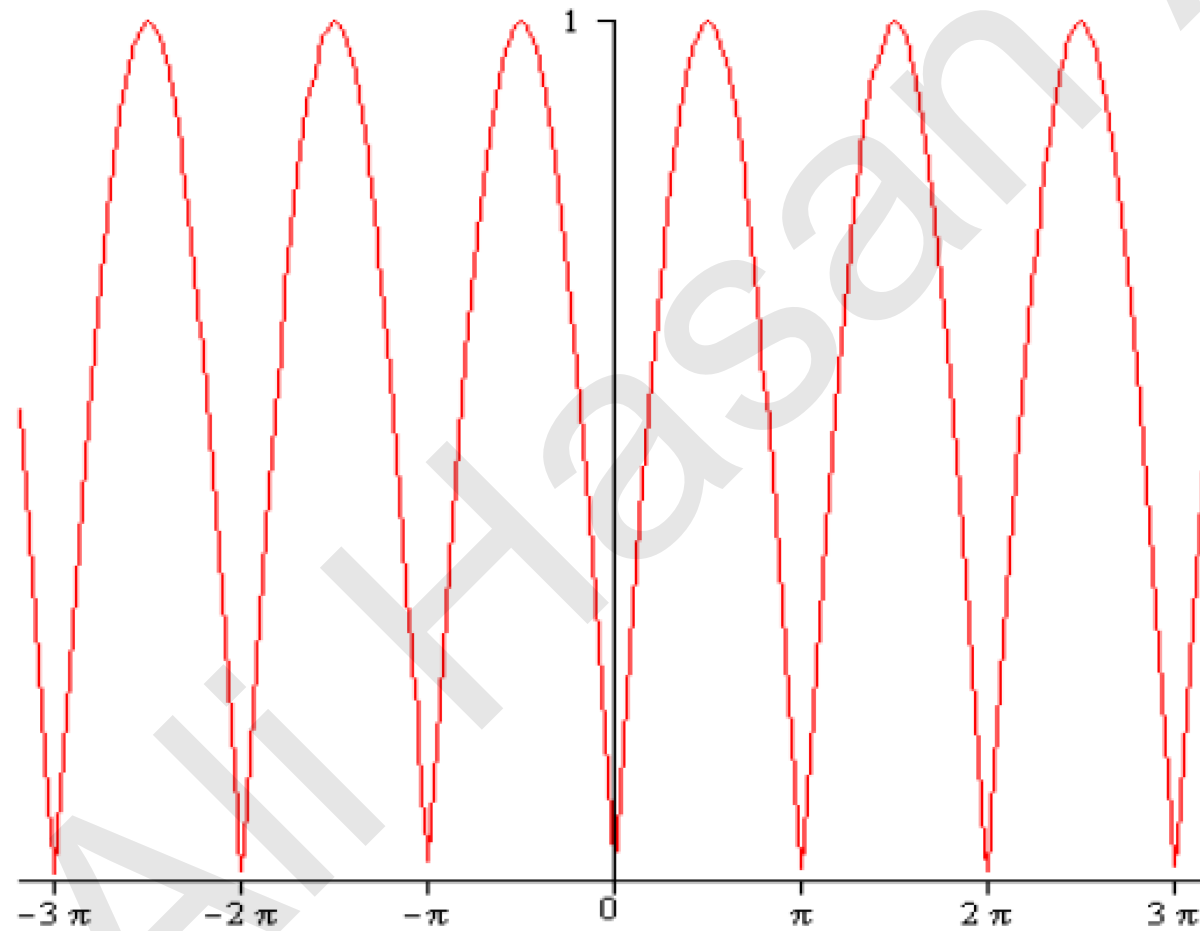
إعداد

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4. ارسم الدالة $f(x) = |\sin(x)|$ مبينا مجالها ومداهما

$$|\sin(x)| = \begin{cases} \sin(x), & \sin(x) \geq 0 \\ -\sin(x), & \sin(x) < 0 \end{cases}$$

$$|\sin(x)| = \begin{cases} \sin(x), & x \in \dots \cup [-2\pi, -\pi] \cup [0, \pi] \cup [2\pi, 3\pi] \cup \dots \\ -\sin(x), & x \in \dots \cup (-\pi, 0) \cup (\pi, 2\pi) \cup (3\pi, 4\pi) \dots \end{cases}$$



واضح ان $D_f = \mathbb{R}$, $R_f = [0, 1]$

تمارين:

(1) ارسم كل من الدوال التالية مبينا مجالها ومداهها:

$$1. f(x) = [\operatorname{sgn}(x)]$$

$$4. f(x) = x - [x]$$

$$7. f(x) = |x + 1| + |x|$$

$$10. f(x) = |[x + 1] - 2$$

$$2. f(x) = |x^2 - 5x + 6|$$

$$5. f(x) = \sqrt{x} \operatorname{sgn}(\sqrt{x})$$

$$8. f(x) = \frac{\operatorname{sgn}(x + 1)}{x}$$

$$11. f(x) = x[x]$$

$$3. f(x) = x + \operatorname{sgn}(-x)$$

$$6. f(x) = \sqrt{\operatorname{sgn}(x - 2)}$$

$$9. f(x) = \operatorname{sgn}(x^2 + 4)$$

$$12. f(x) = x^2 \cdot \operatorname{sgn}(x)$$

(2) جد قيمة كل من a و b اذا كان مجال الدالة $f(x) = \frac{x-1}{x^2+ax+b}$ هو $\mathbb{R}/\{-1, 2\}$

العلاقات المثلثية:

$$1. \sin^2(x) + \cos^2(x) = 1, \quad \sec^2(x) - \tan^2(x) = 1, \quad \csc^2(x) - \cot^2(x) = 1$$

$$2. \cos(-x) = \cos(x), \quad \sin(-x) = -\sin(x)$$

$$3. \cos(x \pm y) = \cos(x) \cos(y) \mp \sin(x) \sin(y), \\ \sin(x \pm y) = \sin(x) \cos(y) \pm \cos(x) \sin(y)$$

$$\tan(x \pm y) = \frac{\tan(x) \pm \tan(y)}{1 \mp \tan(x) \tan(y)} \quad \cot(x \pm y) = \frac{\cot(x) \cot(y) \mp 1}{\cot(y) \mp \cot(x)}$$

$$4. \sin(2x) = 2 \sin(x) \cos(x), \quad \cos(2x) = \cos^2(x) - \sin^2(x)$$

$$5. \cos^2(x) = \frac{1}{2}(1 + \cos(2x)), \quad \sin^2(x) = \frac{1}{2}(1 - \cos(2x))$$

$$6. \sin(ax) \cos(bx) = \frac{1}{2} [\sin((a-b)x) + \sin((a+b)x)]$$

$$\sin(ax) \sin(bx) = \frac{1}{2} [\cos((a-b)x) - \cos((a+b)x)]$$

$$\cos(ax) \cos(bx) = \frac{1}{2} [\cos((a-b)x) + \cos((a+b)x)]$$