

ملاحظات هامة

- ١- $\text{نها جا س} = \frac{m}{b}$
- ٢- $\text{نها ظا س} = \frac{m}{b}$
- ٣- $\text{نها جا س} = \frac{m}{b}$
- ٤- $\text{نها جا س} = \frac{m}{b}$
- ٥- $\text{نها أس} = \frac{m}{b}$
- ٦- $\text{نها أس} = \frac{m}{b}$
- ٧- $\text{نها جا (ظا س)} = \frac{m}{b}$

أمثلة

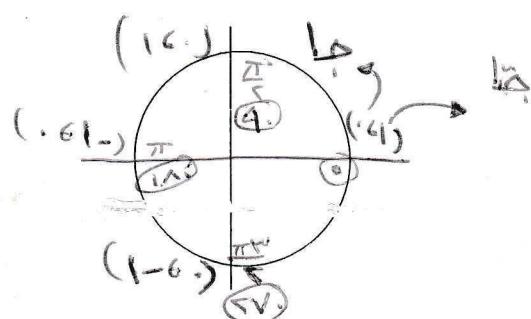
- ١- $\text{نها جا س} = \frac{5}{4}$
- ٢- $\text{نها ظا س} = \frac{3}{2}$
- ٣- $\text{نها جا س} = \frac{2}{7}$
- ٤- $\text{نها جا س} = \frac{9}{8}$
- ٥- $\text{نها جا س} = \frac{8}{7}$
- ٦- $\text{نها جا س} = \frac{6}{5}$
- ٧- $\text{نها جا (ظا س)} = \frac{7}{3}$

$$\text{نها جا س} \neq 1$$

$$\text{نها ظا س} = 1$$

الإقتراحات الدائرية

| ظا | جتا | جا | | |
|----------------------|----------------------|----------------------|-----------------|----|
| $\frac{1}{\sqrt{3}}$ | $\frac{\sqrt{3}}{2}$ | $\frac{1}{2}$ | $\frac{\pi}{6}$ | ٣٠ |
| $\sqrt{3}$ | $\frac{1}{2}$ | $\frac{\sqrt{3}}{2}$ | $\frac{\pi}{3}$ | ٦٠ |
| ١ | $\frac{1}{\sqrt{2}}$ | $\frac{1}{\sqrt{2}}$ | $\frac{\pi}{4}$ | ٤٥ |

دائرة الوحدة**متطابقات هامة**

- $\text{جا س} + \text{جتا س} = 1$
 $\text{جا س}^2 = 2 - \text{جاس جتاس}$
 $\text{جتا س}^2 = \text{جتاس} - \text{جا س}$
 $\text{جتا س}^2 = 1 - 2 \text{ جاس}$
 $\text{جتا س}^2 = 2 \text{ جتاس} - 1$
 $\text{فاس} = 1 + \text{ظاس}$
 $\text{قاس} = 1 + \text{ظتاس}$
 $\text{جاس} = \text{جتا } (\frac{\pi}{2} - \text{س})$
 $\text{جتاس} = \text{جا } (\frac{\pi}{2} - \text{س})$
 $\text{جاس} = \text{جتا } (\frac{\pi}{2} - \text{س})$
 $\text{جاس} - \text{جتم} = 2 \text{ جتاس} + \text{ص} \quad \text{جاس} - \text{ص}$
 $\text{جتاس} - \text{جتم} = -2 \text{ جاس} + \text{ص} \quad \text{جاس} - \text{ص}$
 $\text{جا (س+ص)} = \text{جاس جتاس} + \text{جا ص جتاس}$
 $\text{جنا (س+ص)} = \text{جاس جتاس} + \text{جاس جتاس}$
 $\text{ظا (س+ص)} = \text{ظاس} \pm \text{ظاس}$
 $\text{ظاس ظاس} = \text{ظاس ظاس}$

$$\text{نها جاس} = 1$$

$$\text{ظاس} = \text{جتاس} \quad \text{نها جاس} = \frac{1}{جاس} \quad \text{نها جاس} = \frac{1}{جاس} \quad \text{نها جاس} = \frac{1}{جاس} \quad \text{نها جاس} = \frac{1}{جاس}$$

$$\text{نها ١ - جتا}\quad \boxed{13}$$

$$\text{نها} \cdot \frac{1}{جتا} = \frac{1}{جتا} - \frac{1}{جتا} \cdot \text{نها}$$

$$\frac{1}{جتا} = \frac{\text{نها}}{جتا} - \frac{1}{جتا} \cdot \text{نها}$$

$$= \frac{\text{نها}}{جتا} - \frac{1}{جتا} \cdot \text{نها}$$

$$\boxed{14} \quad \text{نها جا (جتا)} = \frac{\text{نها}}{\text{جتا}} \cdot \frac{\text{جتا}}{\text{جتا}} = \frac{1}{جتا}$$

$$\boxed{15} \quad \text{نها جا} = \frac{\text{نها}}{\text{جتا}} \cdot \frac{1 - \text{جتا}}{\text{جتا}}$$

$$\frac{4}{3} = \frac{3}{2} \times \frac{2}{1} = \frac{\text{نها}}{\text{جتا}} \times \frac{\text{جتا}}{\text{جتا}} = \frac{\text{نها}}{\text{جتا}}$$

$$\boxed{16} \quad \text{نها جتا} = \sqrt{\text{نها}} + \sqrt{\text{نها}} \cdot \text{جتا}$$

$$\text{نها} \cdot \frac{\text{نها}}{\text{جتا}} = \frac{\text{نها}}{\text{جتا}} + \frac{\text{نها}}{\text{جتا}} \cdot \text{جتا}$$

$$\frac{\text{نها}}{\text{جتا}} + \frac{\text{نها}}{\text{جتا}} \cdot \frac{\text{جتا}}{\text{جتا}} = \frac{\text{نها}}{\text{جتا}} + \frac{\text{نها}}{\text{جتا}} \cdot \text{جتا}$$

$$\frac{\text{نها}}{\text{جتا}} = \frac{1}{\text{جتا}} + \frac{\text{نها}}{\text{جتا}} \cdot \frac{\text{جتا}}{\text{جتا}}$$

$$\boxed{17} \quad \text{نها} = \frac{\text{نها}}{\text{جتا}} \cdot \frac{1 - \frac{\text{نها}}{\text{جتا}}}{1 - \frac{\text{نها}}{\text{جتا}}}$$

$$\frac{\text{نها}}{\text{جتا}} \times \frac{1 + \frac{\text{نها}}{\text{جتا}}}{1 + \frac{\text{نها}}{\text{جتا}}} \times \frac{1 - \frac{\text{نها}}{\text{جتا}}}{1 - \frac{\text{نها}}{\text{جتا}}} = \frac{\text{نها}}{\text{جتا}} \times \frac{(1 + \frac{\text{نها}}{\text{جتا}})(1 - \frac{\text{نها}}{\text{جتا}})}{(1 + \frac{\text{نها}}{\text{جتا}})(1 - \frac{\text{نها}}{\text{جتا}})}$$

$$\boxed{18} \quad \frac{1 + \frac{\text{نها}}{\text{جتا}}}{1 - \frac{\text{نها}}{\text{جتا}}} \times \frac{1 - \frac{\text{نها}}{\text{جتا}}}{1 + \frac{\text{نها}}{\text{جتا}}} = \frac{\text{نها}}{\text{جتا}}$$

$$\frac{1}{0} = \frac{1 + \frac{\text{نها}}{\text{جتا}}}{1 - \frac{\text{نها}}{\text{جتا}}} = \frac{(1 + 1) \text{نها}}{1 - 1}$$

$$\boxed{19} \quad \frac{1 - \frac{\text{نها}}{\text{جتا}}}{1 + \frac{\text{نها}}{\text{جتا}}} = \frac{\text{نها}}{\text{جتا}}$$

$$\boxed{20} \quad E = c + c = \frac{(c + \text{نها})(c - \text{نها})}{(c - \text{نها}) \cdot \text{جتا}}$$

النهايات - الواترية

حاجة

$$\frac{1}{0} = \frac{\text{نها}}{\text{جتا}} \quad \frac{0}{1} = \frac{\text{نها}}{\text{جبا}} \quad \frac{1}{1} = \frac{\text{نها}}{\text{جبا}} \quad \frac{0}{0} = \frac{\text{نها}}{\text{جبا}} \quad \frac{1}{0} = \frac{\text{نها}}{\text{جبا}}$$

نهايات؟ $\frac{\text{نها}}{\text{جبا}} \neq 1$

$$\boxed{21} \quad \text{نها جا} = \frac{\sqrt{1 - \text{جبا}}}{\sqrt{1 - \text{جبا}}}$$

$$\boxed{22} \quad \text{نها} = \frac{9x^3}{2x^2} = \frac{9x^2}{2x} = \frac{9x}{2}$$

$$\frac{9}{2} = \frac{9}{2x^2} = \frac{9}{2x} = \frac{9}{2}$$

$$\boxed{23} \quad \text{نها جا} = \frac{\sqrt{1 - \text{جبا}}}{\sqrt{1 - \text{جبا}}}$$

$$\boxed{24} \quad \frac{3}{9} = \frac{\sqrt{9x^3}}{\sqrt{9x^2}} = \sqrt{9x^3} \cdot \frac{1}{\sqrt{9x^2}} = \frac{\sqrt{9x^3}}{\sqrt{9x^2}} = \frac{3}{\sqrt{9x^2}} = \frac{1}{\sqrt{x^2}} = \frac{1}{x}$$

نهايات قاتمه

$$\boxed{25} \quad \frac{1}{\sqrt{1 - \text{جبا}}} = \frac{1}{\sqrt{1 - \frac{\text{نها}}{\text{جبا}}}} = \frac{1}{\sqrt{\frac{\text{جبا} - \text{نها}}{\text{جبا}}}} = \frac{\sqrt{\text{جبا} - \text{نها}}}{\sqrt{\text{جبا}}}$$

$$\boxed{26} \quad \frac{1}{\sqrt{1 - \frac{\text{نها}}{\text{جبا}}}} = \frac{1}{\sqrt{\frac{1}{\text{جبا}} - \frac{\text{نها}}{\text{جبا}}}} = \frac{1}{\sqrt{\frac{\text{جبا} - \text{نها}}{\text{جبا}^2}}} = \frac{\sqrt{\text{جبا} - \text{نها}}}{\sqrt{\text{جبا}^2}} = \frac{\sqrt{\text{جبا} - \text{نها}}}{\text{جبا}}$$

$$\boxed{27} \quad \text{نها} = \frac{\sqrt{\text{جبا} - \text{نها}}}{\sqrt{\text{جبا}^2}} = \frac{\sqrt{\text{جبا} - \text{نها}}}{\text{جبا}}$$

$$\boxed{28} \quad \frac{9}{3} = \frac{3x^2}{2x^2} = \frac{3}{2}$$

$$\boxed{29} \quad \frac{9}{2} = \frac{9x^3}{2x^2} = \frac{9x^2}{2x} = \frac{9x}{2}$$

$$\boxed{30} \quad \frac{9}{2} = \frac{9x^3}{2x^2} = \frac{9x^2}{2x} = \frac{9x}{2}$$

$$\boxed{31} \quad \frac{9}{2} = \frac{9x^3}{2x^2} = \frac{9x^2}{2x} = \frac{9x}{2}$$

$$\boxed{32} \quad \frac{9}{2} = \frac{9x^3}{2x^2} = \frac{9x^2}{2x} = \frac{9x}{2}$$

$$\text{جاءى} = \frac{\text{جتناس}}{\text{جتناس}}$$

$$\text{جتناس} = \frac{\pi}{\pi - 1}$$

$$\text{جتناس} = \frac{\text{جتناس} - 1}{\text{جتناس} - 1}$$

صياغة

$$\frac{1}{r} = \frac{\pi}{\pi - 1}$$

$$\begin{aligned} & \text{جتناس} = \frac{\text{جتناس} - 1}{\text{جتناس} - 1} \\ & \text{جتناس} = \frac{\text{جتناس} - 1}{\text{جتناس} - 1} \end{aligned}$$

$$\text{جتناس} = 1 - \frac{1}{r}$$

$$\text{جتناس} = \frac{1 - r}{1 - r}$$

$$\begin{aligned} & \frac{1}{r} = \frac{\pi - 1}{\pi - 1} \\ & \frac{1}{r} = \frac{\pi - 1 + \text{جتناس}}{\pi - 1 - \text{جتناس}} \end{aligned}$$

$$\begin{aligned} & \text{جتناس} = \frac{\text{جتناس} - 1}{\text{جتناس} - 1} \\ & \text{جتناس} = \frac{\text{جتناس} - 1}{\text{جتناس} - 1} \end{aligned}$$

$$\begin{aligned} & \frac{P - r}{P} = \frac{r}{P} \\ & \frac{P - r}{P} = \frac{P + r}{P} \end{aligned}$$

$$\begin{aligned} & P > \text{جتناس} \\ & \frac{(P - r)}{(P - r)} = \frac{(P + r)}{P} \end{aligned}$$

$$\text{جتناس} = \frac{r}{P}$$

$$\begin{aligned} & \frac{r}{P} = \frac{r}{P} \\ & \frac{r}{P} = \frac{r}{P} \end{aligned}$$

$$17 = 1 - x \times r = \frac{r}{P}$$

$$\text{جتناس} = \frac{r}{P}$$

$$\text{جتناس} = \frac{r}{P}$$

$$\begin{aligned} & \frac{1}{r} = \frac{1}{r} \\ & r = r \end{aligned}$$

$$\begin{aligned} & \frac{r}{P} = \frac{r}{P} \\ & \frac{r}{P} = \frac{(r + r)(P - r)}{(r - r)P} \end{aligned}$$

$$\begin{aligned} & \frac{r}{P} = (r + r) \times \frac{1}{P} = \frac{(r + r)(P - r)}{(r - r)P} \\ & \text{نقسم بـ } r \text{ على } P - r \end{aligned}$$

$$\begin{aligned} & r = \frac{1}{\frac{(r + r)(P - r)}{(r - r)P}} \\ & r = \frac{1}{\frac{(r + r)(P - r)}{(r - r)P}} \end{aligned}$$

$$\begin{aligned} & r = \frac{1}{\frac{(r + r)(P - r)}{(r - r)P}} \\ & r = \frac{1}{\frac{(r + r)(P - r)}{(r - r)P}} \end{aligned}$$

$$\begin{aligned} & r = \frac{1}{\frac{(r + r)(P - r)}{(r - r)P}} \\ & r = \frac{1}{\frac{(r + r)(P - r)}{(r - r)P}} \end{aligned}$$

$$0 = \frac{r}{P}$$

$$\frac{r}{P} = 0 \Leftrightarrow 0 = \frac{r}{P} / 10 = r \Leftrightarrow \frac{r}{P} = \frac{r}{P}$$

$$\text{جتناس} = 1 - \frac{r}{P}$$

$$\begin{aligned} & \frac{r}{P} = \frac{1 - \text{جتناس}}{1 + \text{جتناس}} \\ & \frac{r}{P} = \frac{1 - \text{جتناس}}{1 + \text{جتناس}} \end{aligned}$$

$$\begin{aligned} & \text{جتناس} = 1 + \frac{r}{P} \\ & \text{جتناس} = 1 - \frac{r}{P} \end{aligned}$$

$$\begin{aligned} & \text{جتناس} = \frac{1 - \frac{r}{P}}{1 + \frac{r}{P}} \\ & \text{جتناس} = \frac{1 - \frac{r}{P}}{1 + \frac{r}{P}} \end{aligned}$$

$$\text{جتناس} = \frac{1 - \frac{r}{P}}{1 + \frac{r}{P}}$$

$$\text{جتناس} = \frac{1 - \frac{r}{P}}{1 + \frac{r}{P}}$$

$$\begin{aligned} & \text{جتناس} = \frac{1 - \frac{r}{P}}{1 + \frac{r}{P}} \\ & \text{جتناس} = \frac{1 - \frac{r}{P}}{1 + \frac{r}{P}} \end{aligned}$$

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٣٧

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٣٨

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٣٩

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٠

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤١

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٢

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٣

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٤

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٥

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٦

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٧

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٨

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٤٩

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٠

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥١

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٢

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٣

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٤

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٥

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٦

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٧

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٨

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٥٩

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٠

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦١

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٢

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٣

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٤

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٥

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٦

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٧

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٨

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٦٩

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٧٠

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٧١

$$\frac{1}{1} \times \frac{1}{1} = \frac{1}{1}$$

٧٢

المقدار

المراقبة

الملاحظة

المراقب

الملاحظ

المراقب

الملاحظ

المراقب

الملاحظ

المراقب

الملاحظ

المراقب

الملاحظ

و اجهز

$$\frac{1}{\sqrt{n+1} - \sqrt{n}} \quad [30]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [31]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [32]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} - \frac{1}{\sqrt{n+2} + \sqrt{n+1}} \quad [33]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \text{موجة} \quad [34]$$

حيث $n \geq 0$ مما يعني أن $\sqrt{n+1} > \sqrt{n}$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \times \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+2} - \sqrt{n+1}} = \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+1} + \sqrt{n}}$$

$$1_A = \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+1} + \sqrt{n}} \quad [35]$$

بعد باكورة النهاية موجة و المقام موجة

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = 1 - P \quad [36]$$

$$1_A = \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+1} + \sqrt{n}} \quad [37]$$

$$1_A = \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+1} + \sqrt{n}} \quad [38]$$

$$1_A = \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+1} + \sqrt{n}} \quad [39]$$

$$\begin{aligned} \pi - \pi \sqrt{2} &= \text{جواب} \\ \pi - \pi \sqrt{2} &= \text{جواب} \end{aligned}$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [40]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [41]$$

$$\pi = \frac{\pi - 1}{\sqrt{n+1} + \sqrt{n}} \quad [42]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [43]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \times \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+2} - \sqrt{n+1}} = \frac{\sqrt{n+2} - \sqrt{n+1}}{\sqrt{n+1} + \sqrt{n}}$$

$$0 = r + s = \frac{\sqrt{n+2} - \sqrt{n+1}}{(1+r)(1+s)} \quad [44]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [45]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [46]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [47]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [48]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [49]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [50]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [51]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [52]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [53]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [54]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [55]$$

$$\frac{1}{\sqrt{n+1} + \sqrt{n}} = \frac{1}{\sqrt{n+1} + \sqrt{n}} \quad [56]$$

$$\frac{1}{r} = \frac{(v-\frac{\pi}{2}) \sin \theta}{(\frac{\pi}{2}-v)} = \frac{v \sin \theta - \frac{\pi}{2} \sin \theta}{\pi - 2v}$$

$$\frac{1}{r} = \frac{\pi - v \sin \theta}{\pi - 2v}$$

$$\frac{1}{r} = \frac{v \sin \theta - \frac{\pi}{2} \sin \theta}{v - 2v}$$

$$\frac{1}{r} = \frac{(v-\frac{\pi}{2}) \sin \theta}{(v-\frac{\pi}{2})} = \frac{v \sin \theta - \frac{\pi}{2} \sin \theta}{v - \frac{\pi}{2}}$$

$$\frac{1}{r} = \frac{\frac{v}{v-\frac{\pi}{2}} \sin \theta}{\frac{v}{v-\frac{\pi}{2}}} = \frac{v \sin \theta - \frac{\pi}{2} \sin \theta}{v - \frac{\pi}{2}}$$

$$\frac{\pi}{2} = \frac{(v-\frac{\pi}{2}) \pi}{v} \cdot r = \frac{\pi v - v \pi}{v-2v} \times 1 =$$

$$\frac{1}{r} = \frac{1 - \frac{\pi}{2}}{v - \frac{\pi}{2}}$$

$$\frac{1}{r} = \frac{1 + \frac{1}{1} \times \frac{v \sin \theta - \frac{\pi}{2} \sin \theta}{v - \frac{\pi}{2}}}{1 + \frac{1}{1}}$$

$$\frac{1}{r} = \frac{1 - \frac{\pi}{2}}{(v-\frac{\pi}{2})^2}$$

$$\frac{1}{r} = \frac{(v-\frac{\pi}{2}) \sin \theta (v-\frac{\pi}{2}) \sin \theta}{(v-\frac{\pi}{2})(v-\frac{\pi}{2})} = \frac{(v-\frac{\pi}{2}) \sin \theta}{v-\frac{\pi}{2}}$$

$$\frac{1}{r} = \frac{1}{v-\frac{\pi}{2}}$$

$$\frac{1}{r} = \frac{v-\frac{\pi}{2}}{(v-\frac{\pi}{2}) \sin \theta}$$

$$\frac{1}{r} = \frac{v-\frac{\pi}{2}}{v-\frac{\pi}{2} \sin \theta}$$

$$\frac{1}{r} = \frac{v-\frac{\pi}{2}}{v-\frac{\pi}{2} \sin \theta}$$

$$\frac{1}{r} = \frac{1 - x \frac{\pi}{2} \sin \theta}{1 - x \frac{1}{2} \sin \theta}$$

$$v = \frac{\pi}{2} \sin \theta$$

$$\frac{1}{r} = \frac{v - \frac{\pi}{2} \sin \theta}{v - \frac{\pi}{2}}$$

$$1 = \frac{(v-\frac{\pi}{2}) \sin \theta}{v-\frac{\pi}{2}}$$

$$\frac{\pi}{2} = \frac{(v-1)\pi}{(v-1)v} \sin \theta = \frac{v\pi - \pi \sin \theta}{(v-1)v}$$

$$\frac{v-\frac{\pi}{2}}{v-\frac{\pi}{2} \sin \theta}$$

$$\frac{(v-\frac{\pi}{2}) - \frac{\pi}{2} \sin \theta}{v-\frac{\pi}{2}}$$

$$\frac{1}{r} = \frac{1}{v} = \frac{\frac{v}{2} \sin \theta}{v^2}$$

$$1 = \frac{v-\frac{\pi}{2} \sin \theta}{v}$$

$$\frac{1}{r} = \frac{v-\frac{\pi}{2} \sin \theta}{\pi - v}$$

$$\frac{1}{r} = \frac{(v-\pi)(1-\frac{1}{v} \sin \theta)}{\pi - v}$$

$$\frac{v-\frac{\pi}{2} \sin \theta}{v-\frac{\pi}{2} \sin \theta}$$

$$\frac{1}{r} = \frac{v-\frac{\pi}{2} \sin \theta}{(v-\pi) \sin \theta}$$

$$\frac{v-\frac{\pi}{2} \sin \theta}{\pi - \frac{\pi}{2} \sin \theta}$$

$$v = \frac{1}{\frac{1}{r}} = \frac{(v-\pi \sin \theta) \sin \theta}{(\pi \sin \theta - 1) \frac{1}{r}}$$

$$\frac{1}{r} = \frac{v+\frac{\pi}{2} \sin \theta}{\pi - \frac{\pi}{2} \sin \theta}$$

$$\frac{1}{r} = \frac{v-\frac{\pi}{2} \sin \theta}{\pi - \frac{\pi}{2} \sin \theta} = \frac{(v+\frac{\pi}{2}) - \frac{\pi}{2} \sin \theta}{\pi - \frac{\pi}{2} \sin \theta}$$

$$\boxed{7} \quad \text{زها جها} = \frac{\pi}{\pi - r}$$

$$\frac{\pi - r}{\pi} = \frac{\pi - r - \text{زها جها}}{\pi - r + \text{زها جها}}$$

$$\frac{\pi - r}{\pi} = \frac{\pi - r - \text{زها جها}}{\pi - r + \text{زها جها}} \quad \left| \begin{array}{l} \text{زها جها} \\ \text{زها جها} \end{array} \right.$$

ملاحظة: هناك حل آخر بطريقة المرا خفة

$$\boxed{8} \quad \text{زها جها} = \frac{\pi - r}{\pi - 2r}$$

قسم $\pi - r$ و $\pi - 2r$ على $\pi - r$

$$17 = \frac{1}{(\pi - r)(\pi - 2r)} = \frac{\pi - r - \text{زها جها}}{\pi - r - 2r}$$

$$\boxed{9} \quad \text{زها جها} = \frac{1 + \text{زها جها}}{\pi - r}$$

$$\frac{\pi - r}{\pi} = \frac{\pi - r - \text{زها جها}}{\pi - r}$$

$$z = \frac{\pi - r \times \pi}{\pi - r} = \frac{\pi^2 - \pi r}{\pi - r}$$

خاتمة

$$\frac{\pi + r}{\pi - r} \text{ زها جها}$$

نفيق ونظر π جها

$$\frac{\pi + r}{\pi - r} + \frac{\pi - r}{\pi - r} \text{ زها جها} - \text{زها جها}$$

$$\frac{(1+r)^2 \pi}{\pi - r} + \frac{(\pi - r)^2 \pi}{\pi - r} \text{ زها جها}$$

$$\frac{1-r^2 \pi}{1-r^2 \pi} \times \frac{(1+r)^2 \pi}{\pi - r} + \frac{(1+r)(\pi - r)}{\pi - r} \text{ زها جها} = \frac{(1-r^2 \pi) \pi}{(1-r^2 \pi)(\pi - r)} + (\pi - r) \text{ زها جها}$$

$$\frac{(1-r^2 \pi) \pi}{(1-r^2 \pi)(\pi - r)} + \pi - r$$

$$\frac{(\pi - r) \pi}{(\pi - r)(\pi - r)} - \text{زها جها} = \frac{(\pi - r) \pi}{\pi - r}$$

$$\pi - r = \pi \times \pi + \pi - r$$

تمرين وتدريبات الكتاب

$$\boxed{11} \quad \text{زها جها} = \frac{1 - \pi r}{1 + \pi r}$$

$$\text{زها جها} = \frac{1 - \pi r}{(1 + \pi r) \times (1 + \pi r)}$$

$$r = \frac{\pi - 1}{\pi + 1} = \frac{\pi - 1}{\pi + 1} \times \frac{\pi - 1}{\pi - 1}$$

$$\boxed{12} \quad \text{زها جها} = \frac{\pi - r}{\pi - 2r}$$

$$\text{زها جها} = \frac{\pi - r}{\pi - r}$$

$$\frac{\pi - r}{\pi - r} = \frac{\pi - r}{\pi - r}$$

$$\frac{r}{\pi} = 1 - \frac{r}{\pi} = \frac{(\pi - r)/\pi}{\pi - r}$$

$$\boxed{13} \quad \text{زها جها} = \frac{r}{\pi - r}$$

$$\text{زها جها} = \frac{r - (1 - \text{زها جها})}{\pi - r}$$

$$\boxed{14} \quad 1 = \frac{\pi - \frac{\pi}{r}}{\pi - \frac{\pi}{r}} = \frac{\pi - \frac{\pi}{r}}{\pi - \frac{\pi}{r}}$$

$$\boxed{15} \quad \frac{\pi^3 + w\pi}{\pi - \frac{\pi}{r}} = \frac{\pi^3 + w\pi}{\pi - \frac{\pi}{r}}$$

$$\frac{\pi^3 + w\pi}{\pi} = \pi - \frac{\pi}{r} \quad \leftarrow \quad \pi - \frac{\pi}{r} = w \quad \leftarrow w = \pi - \frac{\pi}{r}$$

$$\frac{(\pi^3 + w\pi) \text{ زها جها}}{w} = \frac{\pi^3 \text{ زها جها}}{\pi - \frac{\pi}{r}}$$

$$\frac{(\pi^3 + w\pi) \text{ زها جها}}{w} = \frac{(\pi^3 + w\pi) \text{ زها جها}}{w}$$

$$r = \frac{w}{\pi^3 + w\pi} - \frac{w}{\pi^3 + w\pi} \cdot w$$

٦- نهاية ١ - جتا س

$$\begin{aligned} &= \text{نهاية } 1 - \frac{\text{جتا س}}{1 + \text{جتا س}} \\ &= \text{نهاية } 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} = \text{نهاية } 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} \\ &= \frac{1}{2} = \frac{1}{1+1} \times 1 \times 1 = \end{aligned}$$

٧- نهاية طا س

$$\begin{aligned} &\text{نهاية } 1 - \frac{\text{طبا س}}{1 + \text{طبا س}} \\ &\text{نهاية } 1 - \frac{\text{طبا س}}{\text{نهاية } 1 + \text{طبا س}} = \text{نهاية } 1 - \frac{\text{طبا س}}{\text{نهاية } 1 + \text{طبا س}} \\ &\text{نهاية } 1 = \end{aligned}$$

٨- نهاية ٢ - جتا س

$$\begin{aligned} &= \text{نهاية } 1 - \frac{1 - \text{جتا س}}{1 + \text{جتا س}} = \text{نهاية } 1 - \frac{1 - \text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} \\ &= \text{نهاية } 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} = \text{نهاية } 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} \\ &= 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} = 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} \\ &= 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} = \text{نهاية } 1 - \frac{\text{جتا س}}{\text{نهاية } 1 + \text{جتا س}} = \text{نهاية } 1 = \end{aligned}$$

٩- نهاية جاه س

$$\begin{aligned} &= \frac{1 + \sqrt{1+s^2}}{1 + \sqrt{1+s^2}} \times \frac{\text{نهاية س}}{1 - \sqrt{1+s^2}} \\ &= \frac{\text{نهاية س}}{\text{نهاية س}} \times \frac{(1 + \sqrt{1+s^2})}{(1 + \sqrt{1+s^2})} \\ &= \frac{(1 + \sqrt{1+s^2}) \times 0}{(1 + \sqrt{1+s^2}) \times 0} = \end{aligned}$$

أمثلة

١- نهاية جاه س + طا س

$$\begin{aligned} &= \text{نهاية } \frac{\text{جاه س}}{\text{س}} + \text{نهاية } \frac{\text{طا س}}{\text{س}} \\ &= \frac{1}{2} = \frac{1}{2} + \frac{0}{2} = \end{aligned}$$

٢- نهاية طا س

$$\begin{aligned} &= \text{نهاية } \frac{\text{طا س}}{\text{س}} = \frac{\text{نهاية } \frac{\text{طا س}}{\text{س}}}{\text{نهاية } \frac{\text{س}}{\text{س}}} \\ &= \frac{1}{2} = \frac{1}{2} \times \frac{1}{2} = \end{aligned}$$

٣- نهاية جاه س + طا س

$$\begin{aligned} &= \text{نهاية } \frac{\text{جاه س}}{\text{س}} + \text{نهاية } \frac{\text{طا س}}{\text{س}} \\ &= \frac{1}{2} + \frac{0 \times 0}{2} = \frac{1}{2} \\ &= \frac{1}{2} \times \frac{1}{2} - \frac{1}{2} = \frac{1}{2} - \frac{1}{2} = 0 = \end{aligned}$$

٤- نهاية طبا س × س

$$\begin{aligned} &= \text{نهاية } \frac{1}{1+s} \times \text{نهاية } s = \text{نهاية } \frac{1}{1+s} \times \text{نهاية } 1 = \\ &= \frac{1}{1+1} = \frac{1}{2} = \end{aligned}$$

٥- نهاية جاه س

$$\begin{aligned} &= \text{نهاية } \frac{\text{جاه س}}{\text{س}} = \frac{\text{نهاية } (\pi - \pi s)}{\text{نهاية } (\pi - \pi s)} \\ &= \frac{\text{نهاية } (\pi - \pi s)}{\text{نهاية } (\pi - \pi s)} = \frac{\text{نهاية } (\pi - \pi s)}{\text{نهاية } (\pi - \pi s)} = \end{aligned}$$

نهاية $\pi s = 1 - s$

$$\begin{aligned} &= \frac{\pi}{\pi} \times \pi = \frac{\pi}{\pi} = \frac{\pi}{\pi} = \frac{\pi}{\pi} = \end{aligned}$$

$$\begin{aligned}
 & 15 - \text{نها} \frac{s}{s+1} \\
 & \text{نها} \frac{s+1}{s+1} = \frac{1}{s+1} \\
 & \text{نها} \frac{(s+1)(s+2)}{s+1} = \text{نها} (s+2) \\
 & \text{نها} \frac{s+2}{s+1} = \text{نها} \frac{s+2}{s+1} \\
 & \text{نها} \frac{s+2}{s+1} = \frac{1}{s+1} \\
 & \text{نها} \frac{1}{s+1} = 1
 \end{aligned}$$

$$\begin{aligned}
 & 10 - \text{نها} \frac{s}{s+2} \\
 & \text{نها} \frac{s+2}{s+2} = \frac{1}{s+2} \\
 & \text{نها} \frac{s+2}{s+2} = \frac{1}{s+2} \\
 & \text{نها} \frac{s+3}{s+2} = \frac{1}{s+2} \\
 & \text{نها} \frac{s+3}{s+2} = \frac{1}{s+2} \\
 & \text{نها} \frac{1}{s+2} = \frac{1}{s+2}
 \end{aligned}$$

$$\begin{aligned}
 & 16 - \text{نها} \frac{2}{2+s} \\
 & \text{نها} \frac{2+s}{2+s} = \frac{1}{2+s} \\
 & \text{نها} \frac{2+s}{2+s} = \frac{1}{2+s} \\
 & \text{نها} \frac{2+s}{2+s} = \frac{1}{2+s} \\
 & \text{نها} \frac{2+s}{2+s} = \frac{1}{2+s}
 \end{aligned}$$

لـ $\frac{1}{2+s}$

$$\begin{aligned}
 & 11 - \text{نها} \frac{1}{1+s} \\
 & \text{نها} \frac{1+s}{1+s} = \frac{1}{1+s} \\
 & \text{نها} \frac{1+s}{1+s} = \frac{1}{1+s} \\
 & \text{نها} \frac{1+s}{1+s} = \frac{1}{1+s}
 \end{aligned}$$

$$\begin{aligned}
 & 12 - \text{نها} \frac{s}{s+2} \\
 & \text{نها} \frac{s+2}{s+2} = s
 \end{aligned}$$

$$17 - \text{نها} \frac{5}{s+2} - \text{حتى} 5$$

لـ $\frac{1}{s+2}$

$$\frac{9}{3} = \frac{1}{2} \times \frac{9}{2} \times 1$$

$$13 - \text{إذا كان } Q(s) = \left\{ \begin{array}{l} s^2, \quad s \geq 2 \\ \text{نها} s, \quad s \leq 2 \end{array} \right. , \quad \text{أو} \quad \text{نها} Q(s)$$

$$18 - \text{نها} \frac{1-s}{s+2} - \text{حتى} s$$

$$\begin{aligned}
 & \text{نها} \frac{1-s}{s+2} = \frac{1-s}{s+2} \\
 & \text{نها} \frac{1-s}{s+2} = \frac{1-s}{s+2} \\
 & \text{نها} \frac{1-s}{s+2} = \frac{1-s}{s+2}
 \end{aligned}$$

$$\begin{aligned}
 & \text{نها} \frac{1-s}{s+2} = \frac{1-s}{s+2} \\
 & \text{نها} \frac{1-s}{s+2} = \frac{1-s}{s+2}
 \end{aligned}$$

$$\text{نها} \frac{1-s}{s+2} = 1$$

$$14 - \text{نها} \frac{1}{1+s} - \text{حتى} s$$

$$\text{نها} \frac{1}{1+s} = \frac{1}{1+s}$$

$$\text{نها} \frac{1}{1+s} = \frac{1}{1+s}$$

$$\text{نها} \frac{1}{1+s} = \frac{1}{1+s}$$

$$\text{نها} \frac{1}{1+s} = \frac{1}{1+s}$$

$$1 = \frac{1}{2} \times \frac{1}{2} \times 1 = 1$$

$$\begin{aligned}
 & 22 - \text{نها جاس} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 + \cot x}{1 - \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{\cot x}{1 + \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{(\cot x)(1 + \csc x)}{(1 - \csc x)(1 + \csc x)} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 - \csc x}{1 + \csc x + \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 - \csc x}{1 + (1 - \csc x)} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 & 19 - \text{نها جاس} \\
 & \frac{1}{\pi - \sin x} = \frac{1}{1 - \csc x} \\
 & \frac{1}{\pi - \sin x} = \frac{1}{\csc x - 1} \\
 & \frac{1}{\pi - \sin x} = \frac{1}{\csc x - (\csc x - 1)} \\
 & \frac{1}{\pi - \sin x} = \frac{1}{\csc x - \csc x + 1} \\
 & \frac{1}{\pi - \sin x} = \frac{1}{1} \\
 & \frac{1}{\pi - \sin x} = \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 & 23 - \text{نها جاس} \\
 & \frac{\pi - \sin x}{\pi - \sin x} \times \frac{\csc x + \cot x}{\csc x + \cot x} \\
 & \frac{(\pi - \sin x)(\csc x + \cot x)}{\pi - \sin x} \\
 & \frac{\pi - \sin x}{\pi - \sin x} \times \frac{\csc x + \cot x}{\pi - \sin x} \\
 & \frac{\pi - \sin x}{\pi - \sin x} \times \frac{\csc x + \cot x}{\pi - \sin x} \\
 & \text{مفر} = 1
 \end{aligned}$$

$$\begin{aligned}
 & 20 - \text{نها جاس} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{1 - \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{\csc x - 1} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{\csc x - (\csc x - 1)} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{\csc x - \csc x + 1} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{1} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 & 24 - \text{إذا كانت لها أحاس} \\
 & \text{فما قيمة } \alpha ?? \\
 & \alpha = \frac{\pi - \frac{\pi}{3}}{\pi - \frac{\pi}{3}} = \frac{\frac{2\pi}{3}}{\frac{2\pi}{3}} = 1 \\
 & \alpha = \frac{\frac{2}{3}\pi}{\frac{2}{3}\pi} = 1 \\
 & \boxed{\alpha = 1} \leftarrow \alpha = \frac{1}{1} \times \frac{\pi}{\pi}
 \end{aligned}$$

$$\begin{aligned}
 & 21 - \text{نها جاس - جاس} \\
 & 1 = \frac{1}{\pi - \sin x} - \frac{1}{\pi + \sin x} \\
 & 1 = \frac{(\pi - \sin x) - (\pi + \sin x)}{(\pi - \sin x)(\pi + \sin x)} \\
 & 1 = \frac{-2\sin x}{\pi^2 - \sin^2 x} \\
 & 1 = \frac{-2\sin x}{\frac{\pi^2 - \sin^2 x}{\sin^2 x}} \\
 & 1 = \frac{-2\sin x}{\frac{\cos^2 x}{\sin^2 x}} \\
 & 1 = \frac{-2\sin x}{\frac{1}{\tan^2 x}} \\
 & 1 = -2\tan^2 x \\
 & 1 = -2 \left(\frac{\pi}{4} \right)^2 \\
 & 1 = -2 \cdot \frac{\pi^2}{16} \\
 & 1 = \frac{\pi^2}{8}
 \end{aligned}$$

$$\begin{aligned}
 & 25 - \text{نها جاس - جاس} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 + \cot x}{1 - \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{\cot x}{1 + \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{(\cot x)(1 + \csc x)}{(1 - \csc x)(1 + \csc x)} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 - \csc x}{1 + \csc x + \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 - \csc x}{1 + (1 - \csc x)} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 & 26 - \text{نها جاس - جاس} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 + \cot x}{1 - \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{\cot x}{1 + \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{(\cot x)(1 + \csc x)}{(1 - \csc x)(1 + \csc x)} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 - \csc x}{1 + \csc x + \csc x} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1 - \csc x}{1 + (1 - \csc x)} \\
 & \frac{\pi}{\pi - \sin x} = \frac{1}{2}
 \end{aligned}$$