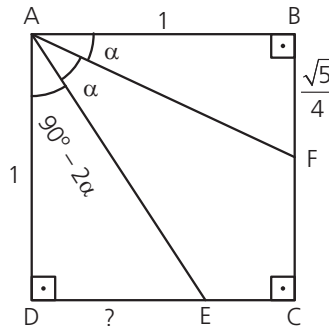


01.

$$\operatorname{tg} \alpha = \frac{\frac{\sqrt{5}}{4}}{1} = \frac{\sqrt{5}}{4}$$

$$\operatorname{tg}(2\alpha) = \frac{2 \cdot \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha} = \frac{2 \cdot \frac{\sqrt{5}}{4}}{1 - \left(\frac{\sqrt{5}}{4}\right)^2} = \frac{\frac{2\sqrt{5}}{4}}{\frac{11}{16}} = \frac{8\sqrt{5}}{11}$$

$$\operatorname{tg}(90^\circ - 2\alpha) = \frac{1}{\operatorname{tg}(2\alpha)} = \frac{1}{\frac{8\sqrt{5}}{11}} = \frac{11}{8\sqrt{5}}$$



No triângulo ADE, temos:

$$\frac{11}{8\sqrt{5}} = \frac{DE}{1} \Leftrightarrow DE = \frac{11\sqrt{5}}{40}$$

Resposta: D

02. $\log [(f(x) + g(x))^2 - f(2x)] = \log[(\operatorname{sen} x + \operatorname{cos} x)^2 - \operatorname{sen}(2x)] = \log(\operatorname{sen}^2 x + 2 \cdot \operatorname{sen} x \cdot \operatorname{cos} x + \operatorname{cos}^2 x - 2 \cdot \operatorname{sen} x \cdot \operatorname{cos} x) = \log(\operatorname{sen}^2 x + \operatorname{cos}^2 x) = \log 1 = 0$

Resposta: B

03. Temos:

$$E = \operatorname{sen}(x + y) \cdot \operatorname{sen}(x - y)$$

$$- 2E = - 2 \operatorname{sen}(x + y) \cdot \operatorname{sen}(x - y)$$

$$- 2E = \operatorname{cos}(2x) - \operatorname{cos}(2y)$$

$$- 2E \operatorname{cos}^2 x - \operatorname{sen}^2 x - [\operatorname{cos}^2 y - \operatorname{sen}^2 y]$$

$$- 2E = \operatorname{cos}^2 x - (1 - \operatorname{cos}^2 x) - [\operatorname{cos}^2 y - (1 - \operatorname{cos}^2 y)]$$

$$- 2E = 2 \operatorname{cos}^2 x - 2 \operatorname{cos}^2 y$$

$$E = \operatorname{cos}^2 y - \operatorname{cos}^2 x$$

Resposta: E

04. Temos:

$$\operatorname{Exp.} = \left(\frac{\operatorname{sen} 50^\circ + \operatorname{sen} 40^\circ}{\operatorname{sen} 50^\circ - \operatorname{sen} 40^\circ} \right) \cdot \operatorname{tg} 5^\circ$$

$$\operatorname{Exp.} = \frac{2 \operatorname{sen}(45^\circ) \operatorname{cos}(5^\circ)}{2 \operatorname{sen}(5^\circ) \operatorname{cos}(45^\circ)} \cdot \operatorname{tg} 5^\circ$$

$$\operatorname{Exp.} = \operatorname{cot} g 5^\circ \cdot \operatorname{tg} 5^\circ = 1$$

Resposta: C

05. Temos:

$$y = \operatorname{cos} 20^\circ + \operatorname{cos} 100^\circ + \operatorname{cos} 140^\circ$$

$$y = 2 \operatorname{cos}(60^\circ) \cdot \operatorname{cos}(-40^\circ) + \operatorname{cos} 140^\circ$$

$$y = \operatorname{cos}(-40^\circ) + \operatorname{cos} 140^\circ$$

$$y = \underbrace{\operatorname{cos} 40^\circ + \operatorname{cos} 140^\circ}_{\text{são opostos}} = 0$$

Resposta: C

06. Temos que:

- $x + y + z = 180^\circ \rightarrow y + z = 180^\circ - x$
- $\text{sen } x = \frac{\text{sen } y + \text{sen } z}{\cos y + \cos z}$

$$\text{sen } x = \frac{2 \text{sen} \left(\frac{y+z}{2} \right) \cos \left(\frac{y-z}{2} \right)}{2 \cos \left(\frac{y+z}{2} \right) \cdot \cos \left(\frac{y-z}{2} \right)}$$

$$\text{sen } x = \frac{\text{sen} \left(90^\circ - \frac{x}{2} \right) \cos \left(\frac{x}{2} \right)}{\cos \left(90^\circ - \frac{x}{2} \right) \text{sen} \left(\frac{x}{2} \right)}$$

$$2 \text{sen} \left(\frac{x}{2} \right) \cos \left(\frac{x}{2} \right) = \frac{\cos \left(\frac{x}{2} \right)}{\text{sen} \left(\frac{x}{2} \right)}$$

Daí,

$$\text{Se } \cos \left(\frac{x}{2} \right) = 0 \rightarrow \frac{x}{2} = 90^\circ \rightarrow x = 180^\circ \text{ (absurdo)}$$

$$\text{Se } \cos \left(\frac{x}{2} \right) \neq 0 \rightarrow 2 \text{sen}^2 \left(\frac{x}{2} \right) = 1 \rightarrow \text{sen} \left(\frac{x}{2} \right) = \frac{\sqrt{2}}{2}$$

Logo:

$$\frac{x}{2} = 45^\circ \rightarrow x = 90^\circ \rightarrow \Delta \text{ é retângulo}$$

Resposta: D

07. Temos:

$$E = \frac{26}{\text{sen } 10^\circ} - 104 \text{sen } 70^\circ \Rightarrow E = \frac{26 - 104 \text{sen } 70^\circ \text{sen } 10^\circ}{\text{sen } 10^\circ} \Rightarrow E = \frac{26 + 52 \cdot (-2 \text{sen } 70^\circ \text{sen } 10^\circ)}{\text{sen } 10^\circ} \Rightarrow$$

$$\Rightarrow E = \frac{26 + 52 \cdot (\cos 80^\circ - \cos 60^\circ)}{\text{sen } 10^\circ} \Rightarrow E = \frac{26 + 52 \cos 80^\circ - 52 \cos 60^\circ}{\text{sen } 10^\circ} \Rightarrow E = \frac{52 \cos 80^\circ}{\text{sen } 10^\circ} = 52$$

Resposta: E

08. Temos:

$$y = \frac{2 \cos \left(\frac{10\pi}{13} \right) \cdot \cos \left(\frac{\pi}{13} \right)}{\cos \left(\frac{4\pi}{13} \right) + \cos \left(\frac{2\pi}{13} \right)}$$

$$y = \frac{2 \cos \left(\frac{10\pi}{13} \right) \cos \left(\frac{\pi}{13} \right)}{2 \cos \left(\frac{3\pi}{13} \right) \cos \left(\frac{\pi}{13} \right)}$$

$$y = \frac{\cos \left(\frac{10\pi}{13} \right)}{\cos \left(\frac{3\pi}{13} \right)}$$

$$\text{Como } \frac{10\pi}{13} + \frac{3\pi}{13} = \pi \rightarrow \cos \left(\frac{10\pi}{13} \right) = -\cos \left(\frac{3\pi}{13} \right)$$

Logo:

$$y = -1$$

Resposta: A

09. Temos:

$$y = \frac{\operatorname{sen} 3x - \operatorname{sen} x}{\cos 2x}$$

$$y = \frac{2 \operatorname{sen}(x) \cos(2x)}{\cos 2x}$$

$$y = 2 \operatorname{sen} x$$

$$\bullet \text{ Se } \cos 2x = \frac{1}{3} \rightarrow 1 - 2 \operatorname{sen}^2 x = \frac{1}{3} \rightarrow \operatorname{sen}^2 x = \frac{1}{3}$$

$$\bullet \text{ Como } x \in (0, \pi) \rightarrow \operatorname{sen} x = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

Logo:

$$y = 2 \operatorname{sen} x = \frac{2\sqrt{3}}{3}$$

Resposta: D

10. Temos:

$$E = \frac{\operatorname{sen} 3x + \operatorname{sen} 5x + \operatorname{sen} 7x + \operatorname{sen} 9x}{\cos 3x + \cos 5x + \cos 7x + \cos 9x}$$

$$E = \frac{2 \operatorname{sen}(4x) \cdot \cos(x) + 2 \operatorname{sen}(8x) \cdot \cos(x)}{2 \cos(4x) \cdot \cos(x) + 2 \cos(8x) \cdot \cos(x)}$$

$$E = \frac{2 \cos x \cdot (\operatorname{sen} 4x + \operatorname{sen} 8x)}{2 \cos x \cdot (\cos 4x + \cos 8x)}$$

$$E = \frac{2 \operatorname{sen}(6x) \cos(2x)}{2 \cos(6x) \cos(2x)}$$

$$E = \frac{\operatorname{sen}(6x)}{\cos(6x)}$$

$$E = \operatorname{tg}(6x)$$

Resposta: E

