

## Lista 08 - Matemática Básica II - 2016.2

1. Para  $0^0 \leq x < 360^0$ , resolva:

(a)  $2\text{sen}x = 1$

(b)  $2 \cos x - \sqrt{3} = 0$

(c)  $\sqrt{3} \cdot \text{cotg}x - 1 = 0$

2. Para  $0 \leq x < 2\pi$ , resolva:

(a)  $4\text{sen}x - \sqrt{3} = 2\text{sen}x$

(b)  $2 \cos x = 6 \cos x - 2\sqrt{3}$

(c)  $3\text{sen}x + 5 = -2\text{sen}x$

3. Para  $0^0 \leq x \leq 360^0$ , resolva:

(a)  $4\text{sen}x - 3 = 0$

(b)  $2 \cos x - 5 = 3 \cos x - 2$

(c)  $\text{sen}x - 3 = 5\text{sen}x$

4. Para  $0 \leq x < 2\pi$ , resolva

(a)  $(\text{sen}x - 1)(2\text{sen}x - 1) = 0$

(b)  $\text{sen}x + 2\text{sen}x \cdot \cos x = 0$

(c)  $2\text{sen}^2x - \text{sen}x - 1 = 0$

5. Para  $0^0 \leq x \leq 360^0$ , resolva:

(a)  $(2 \cos x + \sqrt{3})(2 \cos x + 1) = 0$

(b)  $\sqrt{3} \cdot \text{tg}x - 2\text{sen}x \cdot \text{tg}x = 0$

(c)  $2 \cos^2 x + 11 \cdot \cos x = -5$

6. Para  $0^0 \leq x \leq 360^0$ , resolva:

(a)  $2\text{sen}^2x - 2\text{sen}x - 1 = 0$

(b)  $\cos^2 x + \cos x - 1 = 0$

(c)  $2\text{sen}^2x + 1 = 4\text{sen}x$

7. Encontre todas as soluções:

(a)  $\cos(x - 50^0) = \frac{\sqrt{3}}{2}$

(b)  $\text{sen}(x + 30^0) = \frac{1}{2}$

(c)  $\cos\left(x - \frac{\pi}{9}\right) = -\frac{1}{2}$

(d)  $\text{sen}\left(x + \frac{\pi}{12}\right) = -\frac{\sqrt{2}}{2}$

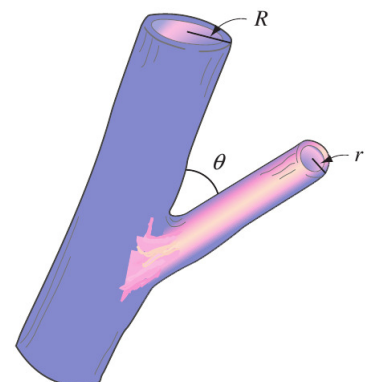
8. Se um projétil é lançado por uma determinada arma com velocidade inicial  $v$  e ângulo de elevação  $\theta$ , então a altura  $h$  do projétil no instante  $t$  é dada por

$$h(t) = -16t^2 + vt.\text{sen}\theta$$

- (a) Encontre a equação da altura se  $v = 1550\text{m/s}$  e  $\theta = 30^\circ$   
 (b) Use a equação do item anterior para encontrar a altura do objeto após 2 segundos.  
 (c) Encontre o ângulo de elevação  $\theta$  de uma arma se o projétil lançado a  $1500\text{m/s}$  leva 2 segundos para atingir uma altura de  $750\text{m}$ .
9. Para  $0^\circ \leq x \leq 360^\circ$ , resolva:  
 (a)  $\sqrt{3}\sec x = 2$   
 (b)  $\sqrt{2}\text{cosec}x + 5 = 3$   
 (c)  $4\text{sen}x - 2\text{cosec}x = 0$   
 (d)  $\sec x - 2\text{tg}x = 0$   
 (e)  $\text{sen}2x - \cos x = 0$   
 (f)  $2\text{sen}x - 1 = \text{cosec}x$
10. Para  $0 \leq x < 2\pi$ , resolva  
 (a)  $\cos 2x - 3\text{sen}x - 2 = 0$   
 (b)  $\cos x - 2\cos 2x = 0$   
 (c)  $2\cos^2 x + \text{sen}x - 1 = 0$   
 (d)  $4\text{sen}^2x + 4\cos x - 5 = 0$   
 (e)  $2\text{sen}x + \text{cotg}x - \text{cosec}x = 0$   
 (f)  $\text{sen}x + \cos x = \sqrt{2}$
11. Para  $0^\circ \leq x \leq 360^\circ$ , resolva:  
 (a)  $\sqrt{3}\text{sen}x + \cos x = \sqrt{3}$   
 (b)  $\sqrt{3}\text{sen}x - \cos x = 1$   
 (c)  $\text{sen}\frac{x}{2} - \cos x = 0$   
 (d)  $\cos\frac{x}{2} - \cos x = 1$   
 (e)  $6\cos x + 7\text{tg}x = \sec x$   
 (f)  $18\sec^2 x - 17\text{tg}x.\sec x - 12 = 0$   
 (g)  $7\text{sen}^2x - 9\cos 2x = 0$

12. No corpo humano, o valor de  $\theta$  que torna a expressão abaixo nula é o ângulo em que uma artéria de raio  $r$  se ramifica a partir de uma artéria de maior raio,  $R$ , para minimizar a perda de energia devido ao atrito. Mostre que a expressão abaixo é zero quando  $\cos \theta = \frac{r^4}{R^4}$

$$r^4\text{cosec}^2\theta - R^4\text{cosec}\theta.\text{cotg}\theta$$



13. Para  $0^{\circ} \leq x \leq 360^{\circ}$ , resolva:

(a)  $2\text{sen}^2x - 2\cos x - 1 = 0$

(b)  $\cos^2x + \text{sen}x = 0$

(c)  $2\text{sen}^2 = 3 - 4\cos x$

14. Para  $0 \leq x < 2\pi$ , resolva:

(a)  $\cos x + 3\text{sen}x - 2 = 0$

(b)  $\text{sen}^2x - 3\text{sen}x - 1 = 0$

(c)  $\sec x + 2 = \text{cot}gx$

15. Para  $0^{\circ} \leq x \leq 360^{\circ}$ , resolva:

(a)  $\text{sen}2x = \frac{\sqrt{3}}{2}$

(b)  $\text{tg}2x = -1$

(c)  $\cos 3x = -1$

16. Para  $0 \leq x < 2\pi$ , resolva:

(a)  $\cos 2x = \frac{\sqrt{2}}{2}$

(b)  $\sec 3x = -1$

(c)  $\text{tg}2x = \sqrt{3}$

17. Encontre todas as soluções:

(a)  $\text{sen}2x = \frac{1}{2}$

(b)  $\cos 3x = 0$

(c)  $\text{sen}10x = \frac{\sqrt{3}}{2}$

18. Para  $0^{\circ} \leq x \leq 360^{\circ}$ , resolva:

(a)  $\text{sen}2x = -\frac{\sqrt{2}}{2}$

(b)  $\cos 3x = \frac{1}{2}$

(c)  $\text{tg}2x = \frac{\sqrt{3}}{3}$

19. Para  $0 \leq x < 2\pi$ , resolva:

(a)  $\text{sen}2x \cdot \cos x + \cos 2x \cdot \text{sen}x = \frac{1}{2}$

(b)  $\cos 2x \cdot \cos x - \text{sen}2x \cdot \text{sen}x = -\frac{\sqrt{3}}{2}$

20. Encontre todas as soluções:

(a)  $\text{sen}3x \cdot \cos 2x + \cos 3x \cdot \text{sen}2x = 1$

(b)  $\text{sen}^24x = 1$

- (c)  $\cos^3 5x = -1$
- (d)  $2\sin^2 3x + \sin 3x - 1 = 0$
- (e)  $2 \cos^2 2x + 3 \cos 2x + 1 = 0$
- (f)  $\operatorname{tg}^2 3x = 3$

21. Para  $0^\circ \leq x \leq 360^\circ$ , resolva:

- (a)  $\cos x - \sin x = 1$
- (b)  $\sin x + \cos x = -1$
- (c)  $\sin^2 2x - 4\sin 2x - 1 = 0$
- (d)  $4 \cos^2 3x - 8 \cos 3x + 1 = 0$
- (e)  $2 \cos^2 4x + 2\sin 4x = 1$

## Gabarito

1.
  - (a)  $30^\circ, 150^\circ$
  - (b)  $30^\circ, 330^\circ$
  - (c)  $60^\circ, 240^\circ$
2.
  - (a)  $\frac{\pi}{3}, \frac{2\pi}{3}$
  - (b)  $\frac{\pi}{6}, \frac{11\pi}{6}$
  - (c)  $\frac{3\pi}{2}$
3.
  - (a)  $48.6^\circ ; 131.4^\circ$
  - (b)  $\emptyset$
  - (c)  $228.6^\circ ; 311.4^\circ$
4.
  - (a)  $\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$
  - (b)  $0, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}$
  - (c)  $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$
5.
  - (a)  $120^\circ, 150^\circ, 210^\circ, 240^\circ$
  - (b)  $0^\circ, 60^\circ, 120^\circ, 180^\circ$
  - (c)  $120^\circ, 240^\circ$
6.
  - (a)  $201.5^\circ ; 338.5^\circ$
  - (b)  $51.8^\circ ; 308.2^\circ$
  - (c)  $17^\circ, 163^\circ$

7. (a)  $20^0 + 360^0k$ ,  $80^0 + 360^0k$   
 (b)  $360^0k$ ,  $120^0 + 360^0k$   
 (c)  $\frac{7\pi}{9} + 2k\pi$ ,  $\frac{13\pi}{9} + 2k\pi$   
 (d)  $\frac{7\pi}{6} + 2k\pi$ ,  $\frac{5\pi}{3} + 2k\pi$
8. (a)  $h = -16t^2 + 750t$   
 (b)  $1,436m$   
 (c)  $15.7^0$
9. (a)  $30^0, 330^0$   
 (b)  $225^0, 315^0$   
 (c)  $45^0, 135^0, 225^0, 315^0$   
 (d)  $30^0, 150^0$   
 (e)  $30^0, 90^0, 150^0, 270^0$   
 (f)  $90^0, 210^0, 330^0$
10. (a)  $\frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$   
 (b)  $0, \frac{2\pi}{3}, \frac{4\pi}{3}$   
 (c)  $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$   
 (d)  $\frac{\pi}{3}, \frac{5\pi}{3}$   
 (e)  $\frac{2\pi}{3}, \frac{4\pi}{3}$   
 (f)  $\frac{\pi}{4}$
11. (a)  $30^0, 90^0$   
 (b)  $60^0, 180^0$   
 (c)  $60^0, 300^0$   
 (d)  $120^0, 180^0$   
 (e)  $210^0, 330^0$   
 (f)  $41.8^0 ; 48.6^0 ; 131.4^0 ; 138.2^0$   
 (g)  $36.9^0 ; 143.1^0 ; 216.9^0 ; 323.1^0$
- 12.
13. (a)  $68.5^0 ; 291.5^0$   
 (b)  $218.2^0 ; 321.8^0$   
 (c)  $73^0, 287^0$

14. (a)  $0.3630rad$  ,  $2.1351rad$   
 (b)  $3.4492rad$  ,  $5.9756rad$   
 (c)  $0.3166rad$  ,  $1.9917rad$
15. (a)  $30^0, 60^0, 210^0, 240^0$   
 (b)  $67.5^0$  ;  $157.5^0$  ;  $247.5^0$  ;  $337.5^0$   
 (c)  $60^0, 180^0, 300^0$
16. (a)  $\frac{\pi}{8}, \frac{7\pi}{8}, \frac{9\pi}{8}, \frac{15\pi}{8}$   
 (b)  $\frac{\pi}{3}, \pi, \frac{5\pi}{3}$   
 (c)  $\frac{\pi}{6}, \frac{2\pi}{3}, \frac{7\pi}{6}, \frac{5\pi}{3}$
17. (a)  $15^0 + 180^0k$  ;  $75^0 + 180^0k$   
 (b)  $30^0 + 60^0k$   
 (c)  $6^0 + 36^0k$  ;  $12^0 + 36^0k$
18. (a)  $112.5^0$  ;  $157.5^0$  ;  $292.5^0$  ;  $337.5^0$   
 (b)  $20^0, 100^0, 140^0, 220^0, 260^0, 340^0$   
 (c)  $15^0, 105^0, 195^0, 285^0$
19. (a)  $\frac{\pi}{18}, \frac{5\pi}{18}, \frac{13\pi}{18}, \frac{17\pi}{18}, \frac{25\pi}{18}, \frac{29\pi}{18}$   
 (b)  $\frac{5\pi}{18}, \frac{7\pi}{18}, \frac{17\pi}{18}, \frac{19\pi}{18}, \frac{29\pi}{18}, \frac{31\pi}{18}$
20. (a)  $\frac{\pi}{10} + \frac{2k\pi}{5}$   
 (b)  $\frac{\pi}{8} + \frac{k\pi}{4}$   
 (c)  $\frac{\pi}{5} + \frac{2k\pi}{5}$   
 (d)  $10^0 + 120^0k$  ;  $50^0 + 120^0k$  ;  $90^0 + 120^0k$   
 (e)  $60^0 + 180^0k$  ;  $90^0 + 180^0k$  ;  $120^0 + 180^0k$   
 (f)  $20^0 + 60^0k$  ;  $40^0 + 60^0k$
21. (a)  $0^0, 270^0$   
 (b)  $180^0, 270^0$   
 (c)  $96.8^0, 173.2^0, 276.8^0, 353.2^0$   
 (d)  $27.4^0, 92.6^0, 147.4^0, 212.6^0, 267.4^0, 332.6^0$   
 (e)  $50.4^0, 84.6^0, 140.4^0, 174.6^0, 230.4^0, 264.6^0, 320.4^0, 354.6^0$