Universidade Federal de Santa Catarina
Centro de Ciências Físicas e Matemáticas
Departamento de Matemática

MTM3100 - Pré-cálculo

Gabarito parcial da 13ª lista complementar de exercícios

1. **(a)** Não há solução. **(b)** $x = 1$. **(c)** $x = -3$. **(d)** Não há solução.

(e) $x = -3$. **(f)** $x = -2\log 2$. **(g)** $x = \dfrac{\ln 12}{3}$. **(h)** $x = \dfrac{1+\log_3 5}{2}$.

(i) $x = \ln\left(\dfrac{10}{3}\right)$. **(j)** $x = \dfrac{2\log_3 2}{5}$. **(k)** $x = \dfrac{1+\log_2 17}{3}$. **(l)** $x = \dfrac{\ln(17/2)}{12}$.

(m) **(n)** $x = \dfrac{\log(5/4)}{5}$ **(o)** $x = -100\log_5 2$. **(p)** $x = \dfrac{3-4\ln 2}{5}$.

(q) $x = \dfrac{5\log_2 5}{6}$. **(r)** **(s)** $x = \dfrac{\ln 200 - 1}{2}$. **(t)** $x = -\dfrac{\log_2 75}{2}$.

(u) **(v)** $x = -\dfrac{2\log 3 + \log 2}{3\log 2 - \log 3}$. **(w)** $x = -3\ln 2$. **(x)** $t = \dfrac{\log_{26/25} 3}{2}$.

(y) $t = \dfrac{\log_{161/160} 2}{12}$.

2. **(a)** $x = \ln 3$. **(b)**

(c) $x = 0$ ou $x = \dfrac{4}{3}$. **(d)** $x = \dfrac{-1-\sqrt{5}}{2}$ ou $x = \dfrac{-1+\sqrt{5}}{2}$.

3. **(a)** $x = \dfrac{95}{3}$. **(b)** $x = -25$.

(c) **(d)** $x = 2$ ou $x = 4$.

(e) **(f)** $x = 4$.

(g) $x = \dfrac{21}{13}$. **(h)** $x = 4$.

(i) $x = 5$. **(j)**

(k) $5^{-2\log_6 2}$.

4. **(a)** Uma solução. **(b)** Duas soluções.

(c) Uma solução. **(d)**

5. **(a)** $S = \mathbb{R}$. **(b)** $S = (\log 2, \log 5)$.

(c) $S = [8, 16]$. **(d)** $S = (2, 4) \cup (7, 9)$.

(e) $S = (-\sqrt{3}/3, \sqrt{3}3)$.

6. **(a)** $f^{-1}(x) = -3 + \log_3 x$, $x > 0$. **(b)** $f^{-1}(x) = \dfrac{e^x}{3}$.

7. $f^{-1}(x) = \operatorname{arccosh} x = \ln(x + \sqrt{x^2 - 1})$, $x \geq 1$.

8. $f^{-1}(x) = \operatorname{arcsenh} x = \ln(x + \sqrt{x^2 + 1})$.

9. **(a)** $T(t) = 5 + 100e^{-0{,}11t}$.

(b) $T(20) = 5 + 100e^{-0{,}11 \cdot 20} \cong 16^\circ\, C$.

10. **(a)** $t(I) = \dfrac{5}{13} \ln\left(\dfrac{60}{60 - 13I}\right)$.

(b)

11. **(a)** $x = -\dfrac{2\sqrt{2}}{3}$.

(b) $x = 0$.

(c)

(d) $y = \dfrac{\sqrt{21}}{5}$.

(e)

(f) $y = \dfrac{\sqrt{5}}{3}$.

12. **(a)** $(-\sqrt{3}/2, -1/2)$. **(b)** $(1/2, -\sqrt{3}/2)$. **(c)** **(d)** $(\sqrt{3}/2, -1/2)$.

13.

14.

15. **(a)** $\left(-\frac{3}{5}, \frac{4}{5}\right)$; **(b)** $\left(-\frac{3}{5}, -\frac{4}{5}\right)$; **(c)** **(d)** $\left(\frac{3}{5}, \frac{4}{5}\right)$;

(e) $\left(\frac{3}{5}, -\frac{4}{5}\right)$; **(f)** **(g)** $\left(-\frac{4}{5}, \frac{3}{5}\right)$; **(h)** $\left(\frac{4}{5}, -\frac{3}{5}\right)$.

16. **(a)** $\bar{t} = \dfrac{\pi}{4}$. **(b)** $\bar{t} = \dfrac{\pi}{6}$. **(c)** $\bar{t} = \dfrac{\pi}{4}$. **(d)** $\bar{t} = \dfrac{\pi}{6}$.

(e) $\bar{t} = \dfrac{\pi}{4}$. **(f)** $\bar{t} = \dfrac{\pi}{6}$. **(g)** $\bar{t} = \dfrac{\pi}{3}$.

17. **(a)** $(\sqrt{2}/2, \sqrt{2}/2)$ e $(-\sqrt{2}/2, \sqrt{2}/2)$.

(b) $(\sqrt{3}/2, 1/2)$ e $(\sqrt{3}/2, -1/2)$.

(c) $(\sqrt{2}/2, \sqrt{2}/2)$ e $(-\sqrt{2}/2, -\sqrt{2}/2)$.

(d)

(e) $(\sqrt{2}/2, \sqrt{2}/2)$ e $(\sqrt{2}/2, \sqrt{2}/2)$.

(f)

(g) $(1/2, \sqrt{3}/2)$ e $(-1/2, -\sqrt{3}/2)$.

18. **(a)** $\operatorname{sen} \pi/3 = \sqrt{3}/2$, $\cos \pi/3 = 1/2$, $\operatorname{tg} \pi/3 = \sqrt{3}$, $\operatorname{cotg} \pi/3 = \sqrt{3}/3$, $\sec \pi/3 = 2$, $\operatorname{cossec} \pi/3 = 2\sqrt{3}/3$.

(b)

(c) $\operatorname{sen} 4\pi/3 = -\sqrt{3}/2$, $\cos 4\pi/3 = -1/2$, $\operatorname{tg} 4\pi/3 = \sqrt{3}$, $\operatorname{cotg} 4\pi/3 = \sqrt{3}/3$, $\sec 4\pi/3 = -2$, $\operatorname{cossec} 4\pi/3 = -2\sqrt{3}/3$.

(d)

(e) $\operatorname{sen}(-5\pi/3) = \sqrt{3}/2$, $\cos(-5\pi/3) = 1/2$, $\operatorname{tg}(-5\pi/3) = \sqrt{3}$, $\operatorname{cotg}(-5\pi/3) = \sqrt{3}/3$, $\sec(-5\pi/3) = 2$, $\operatorname{cossec}(-5\pi/3) = 2\sqrt{3}/3$.

(f) $\operatorname{sen}(4\pi/3 + 2k\pi) = -\sqrt{3}/2$, $\cos(4\pi/3 + 2k\pi) = -1/2$, $\operatorname{tg}(4\pi/3 + 2k\pi) = \sqrt{3}$, $\operatorname{cotg}(4\pi/3 + 2k\pi) = \sqrt{3}/3$, $\sec(4\pi/3 + 2k\pi) = -2$, $\operatorname{cossec}(4\pi/3 + 2k\pi) = -2\sqrt{3}/3$.

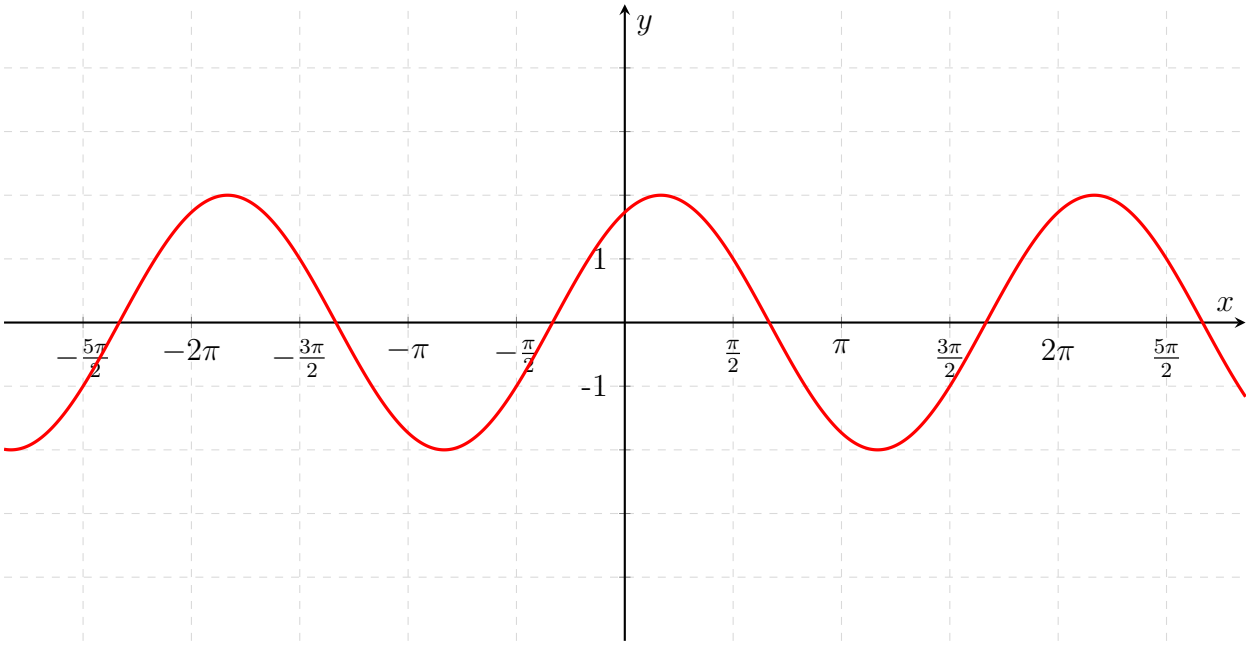
19.

20. $\operatorname{sen} t = -\sqrt{1 - \cos^2 t}$, $\operatorname{tg} t = -\dfrac{\sqrt{1 - \cos^2 t}}{\cos t}$ e $\operatorname{cotg} t = -\dfrac{\cos t}{\sqrt{1 - \cos^2 t}}$.

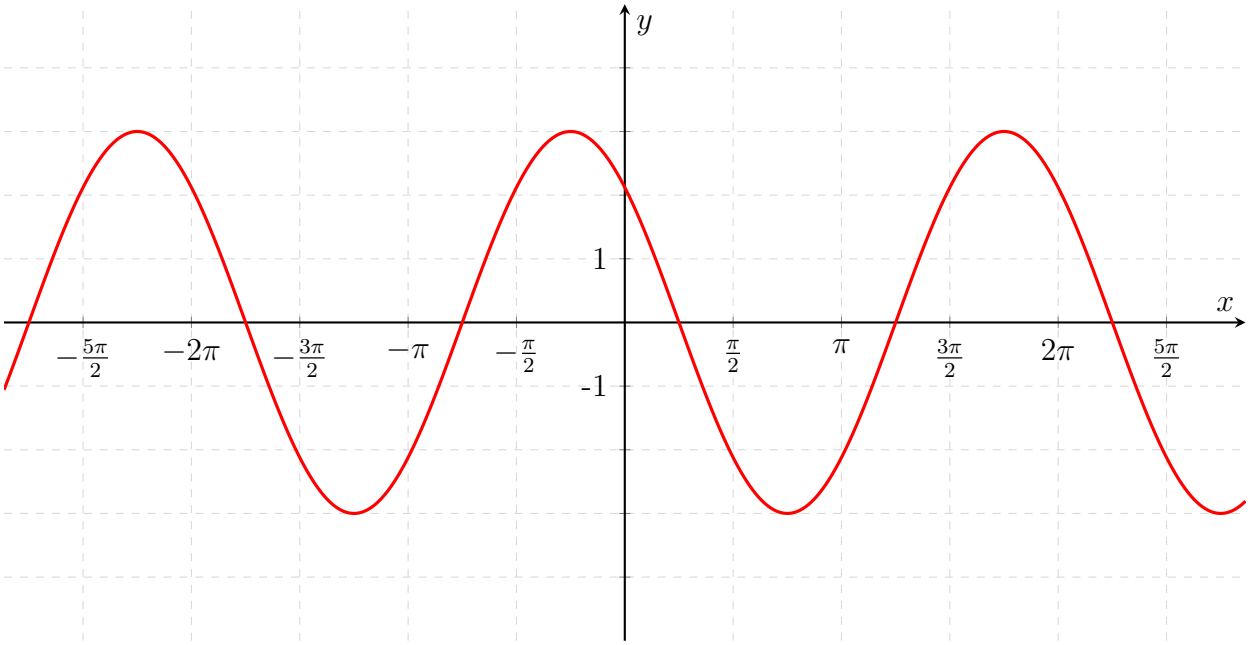
21. $\operatorname{sen} t = \dfrac{\operatorname{tg} t}{\sqrt{1 + \operatorname{tg}^2 t}}$, $\cos t = \dfrac{1}{\sqrt{1 + \operatorname{tg}^2 t}}$, $\operatorname{cotg} t = \dfrac{1}{\operatorname{tg} t}$, $\sec t = \sqrt{1 + \operatorname{tg}^2 t}$ e $\operatorname{cossec} t = \dfrac{\sqrt{1 + \operatorname{tg}^2 t}}{\operatorname{tg} t}$.

22.

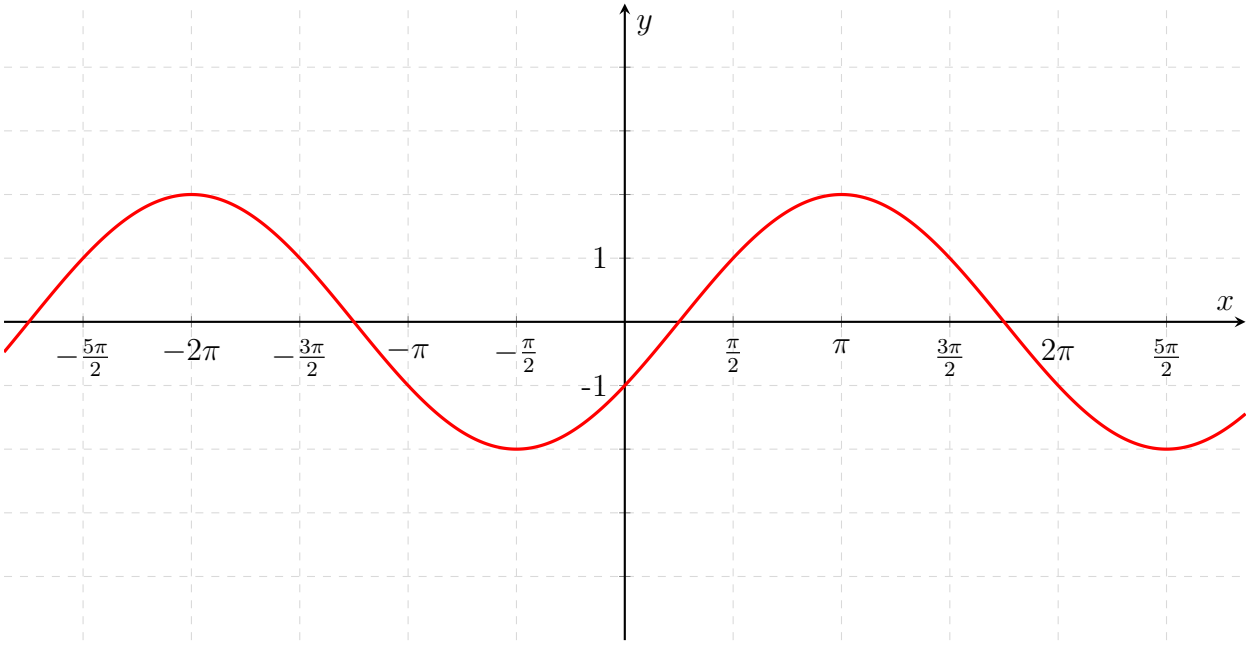
23. **(a)** Período 2π, amplitude 2 e fase $-\pi/3$.



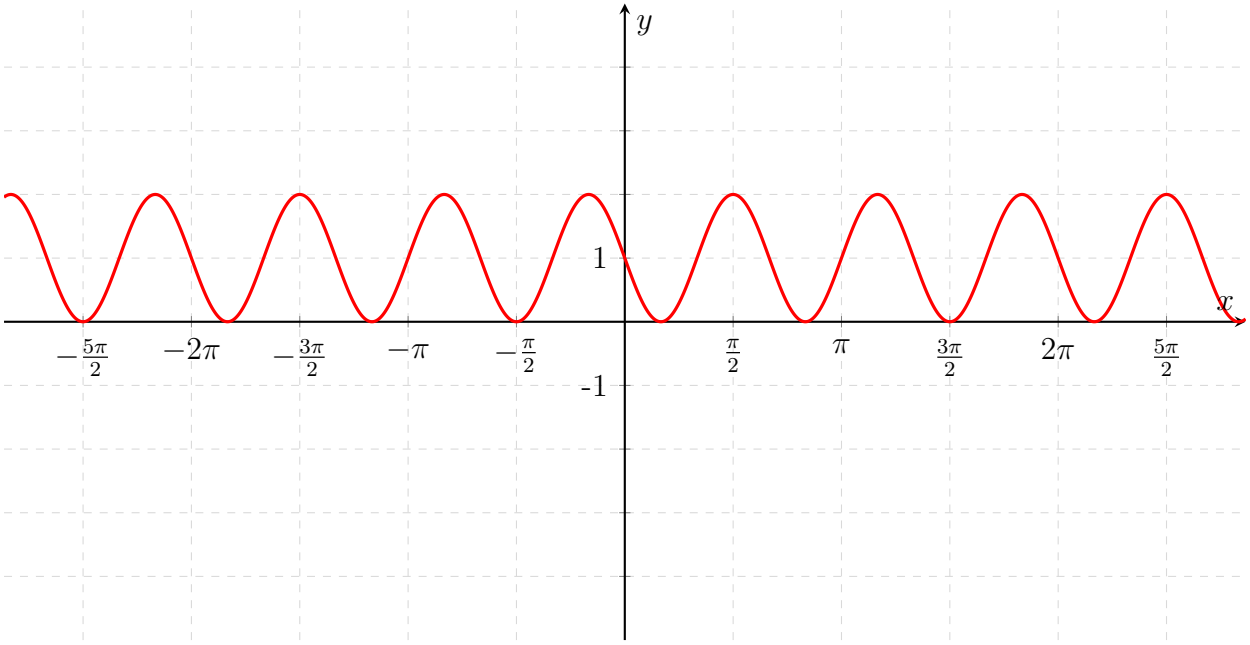
(b) Período 2π, amplitude 3 e fase $-\pi/4$.



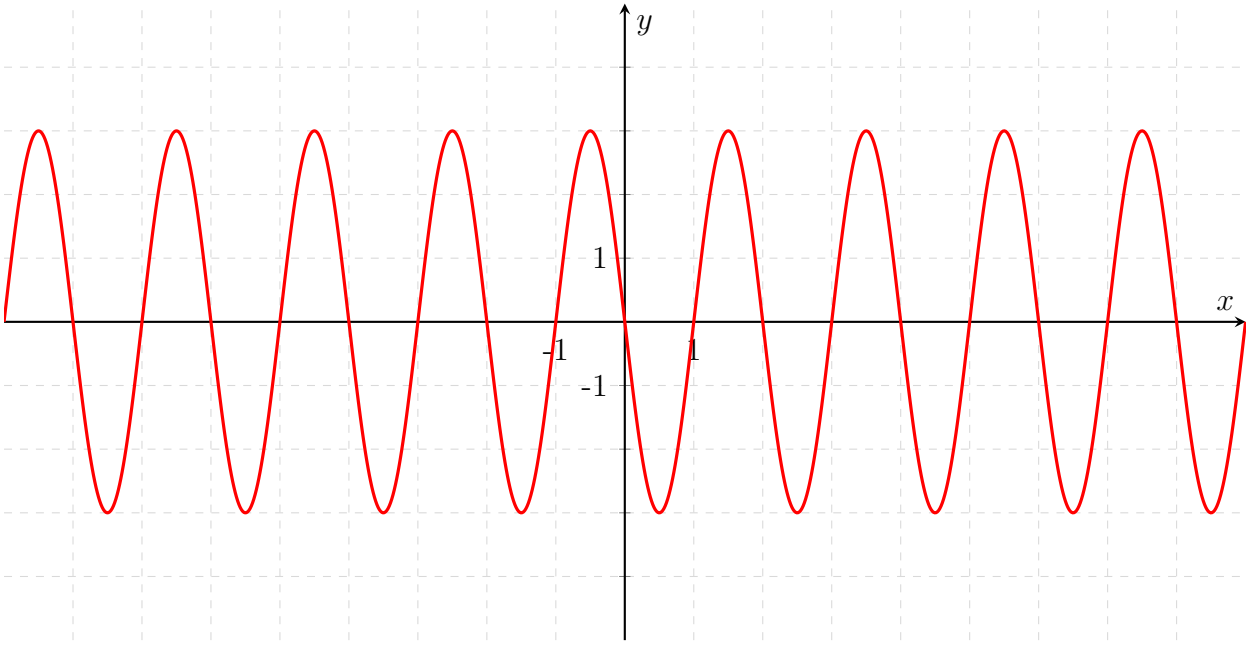
(c) Período 3π, amplitude 2 e fase $\pi/4$.



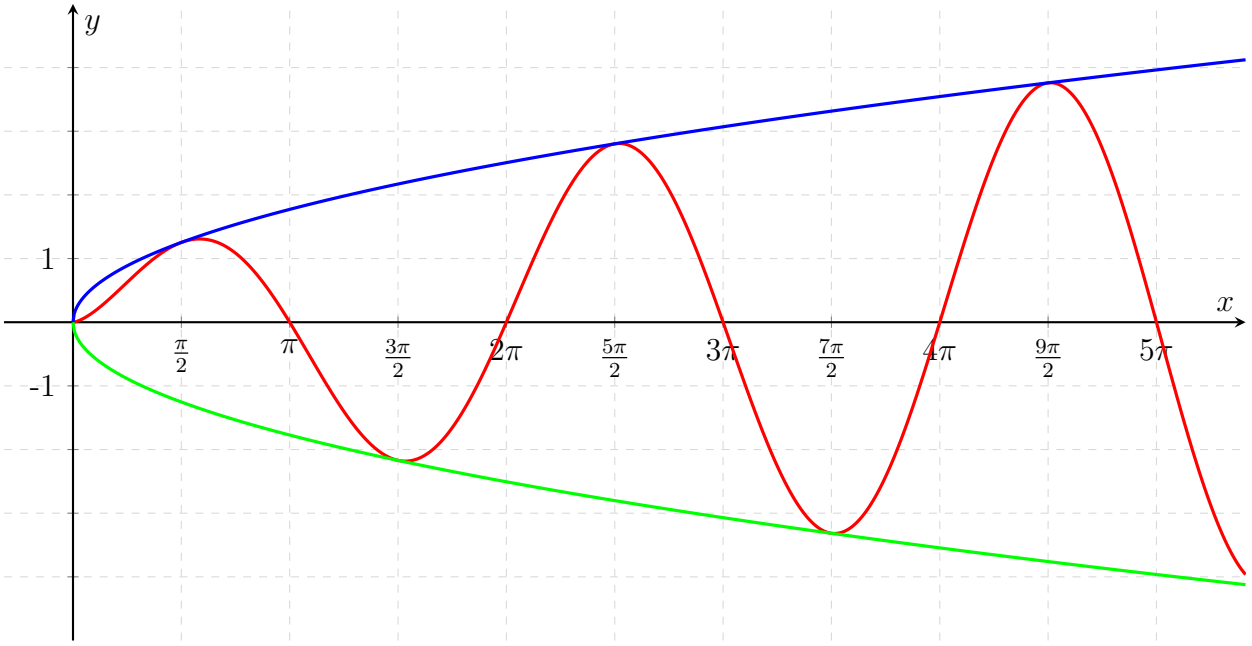
(d) Período $2\pi/3$, amplitude 1 e fase $-\pi/6$.



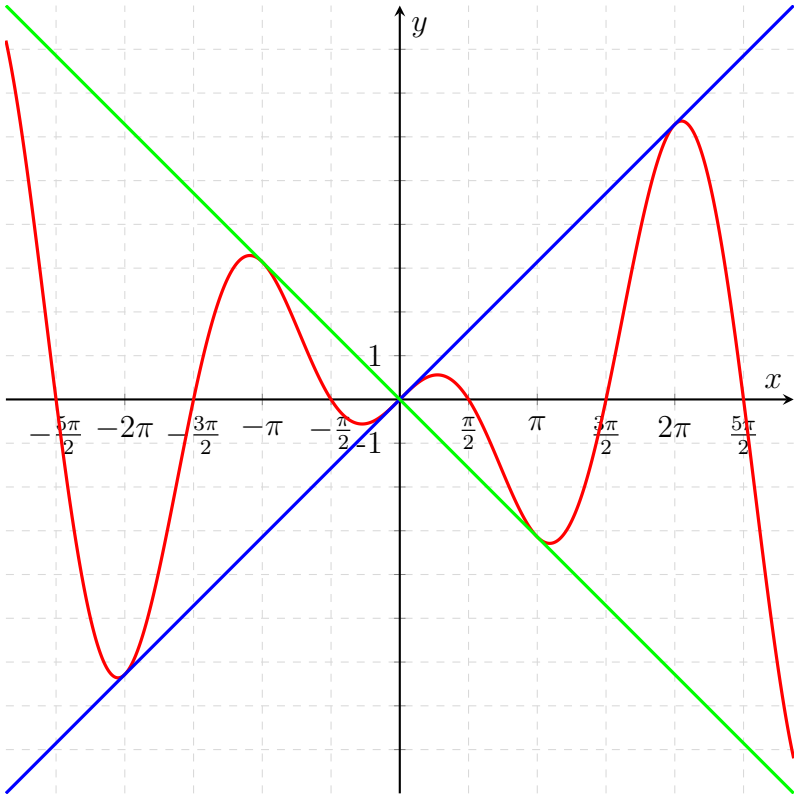
(e) Período 2, amplitude 3 e fase $-1/2$.



24. **(a)**



(b)

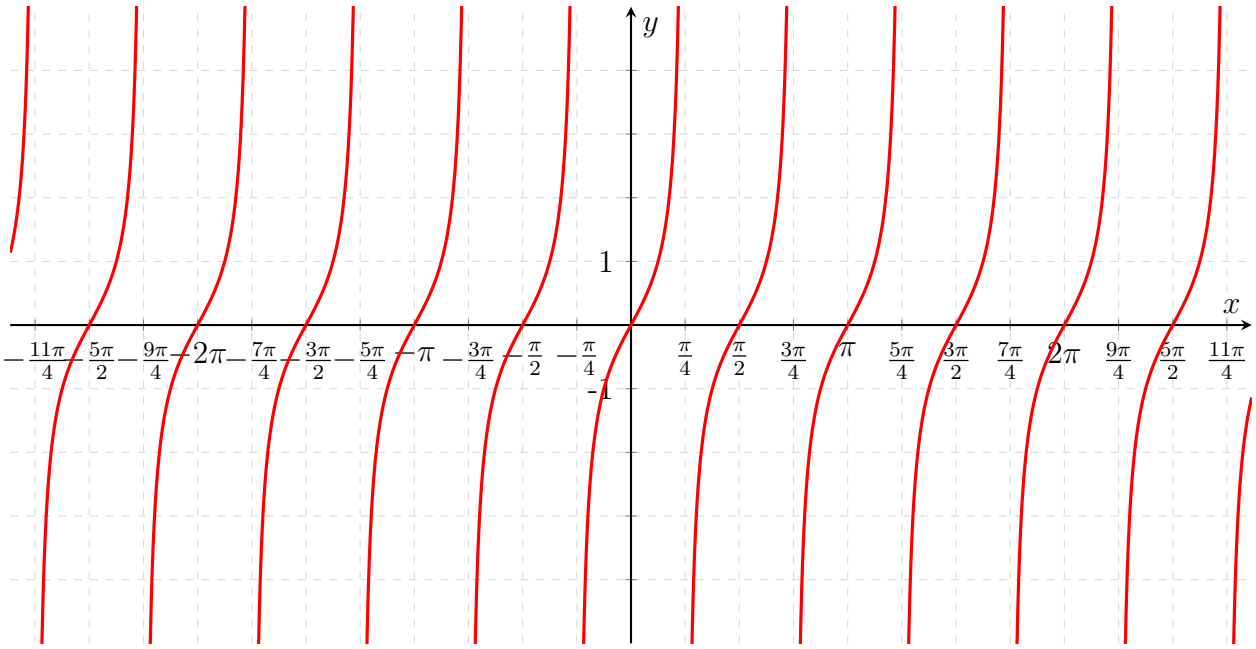


25. **(a)** 1/80 min.

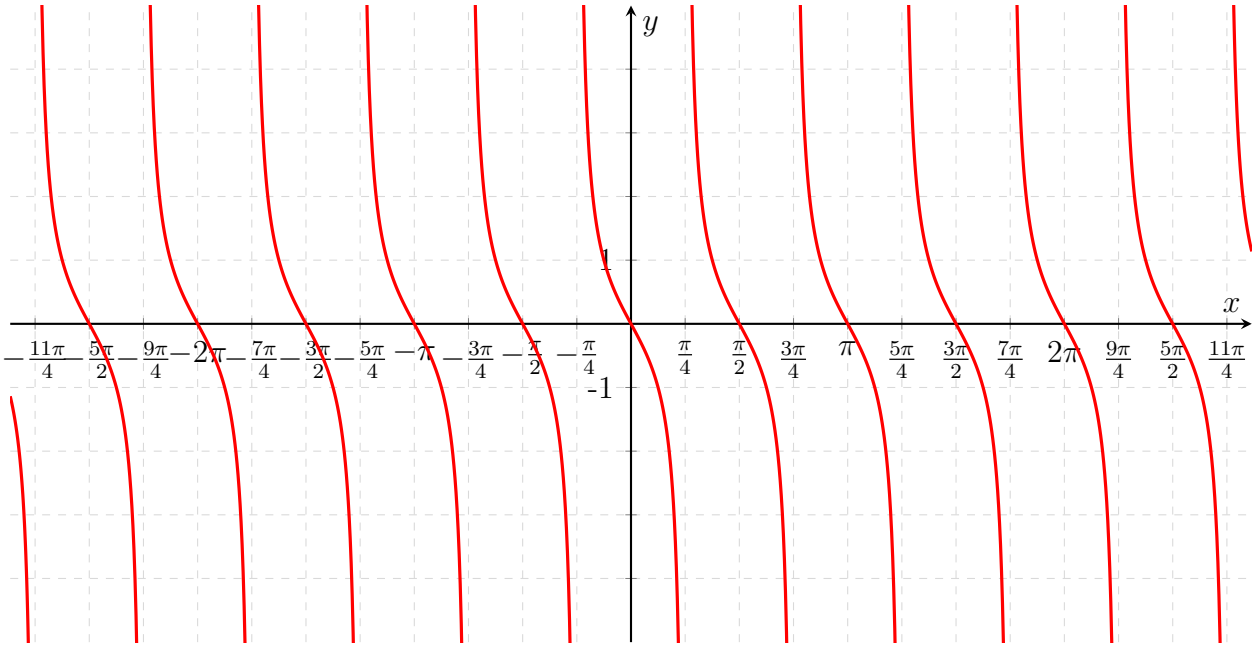
(b) 140/90.

(c) 80 batidas por minuto.

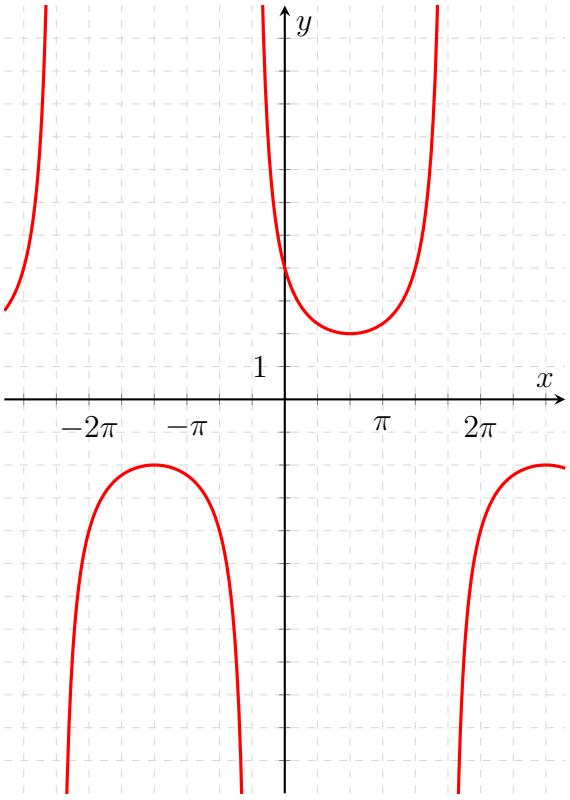
26. **(a)**



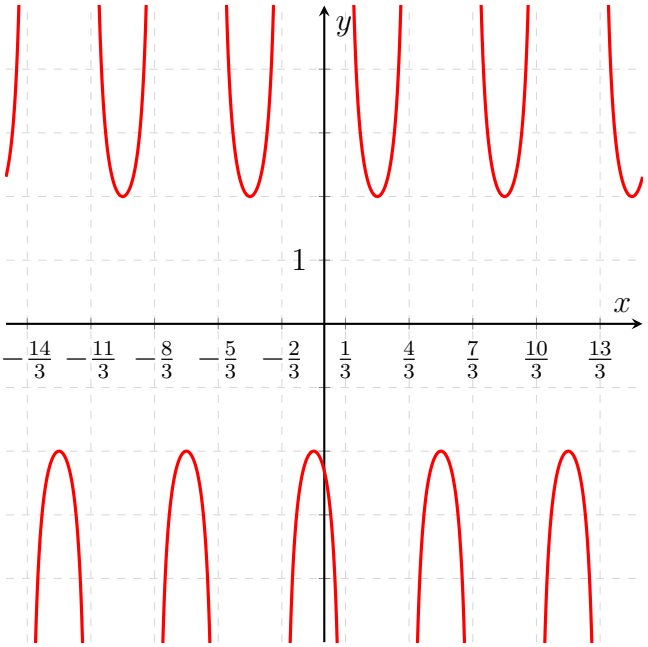
(b)


y
x
1
-1
$-\frac{11\pi}{4}$ $-\frac{5\pi}{2}$ $-\frac{9\pi}{4}$ -2π $-\frac{7\pi}{4}$ $-\frac{3\pi}{2}$ $-\frac{5\pi}{4}$ $-\pi$ $-\frac{3\pi}{4}$ $-\frac{\pi}{2}$ $-\frac{\pi}{4}$
$\frac{\pi}{4}$ $\frac{\pi}{2}$ $\frac{3\pi}{4}$ π $\frac{5\pi}{4}$ $\frac{3\pi}{2}$ $\frac{7\pi}{4}$ 2π $\frac{9\pi}{4}$ $\frac{5\pi}{2}$ $\frac{11\pi}{4}$

(c)


y
x
1
-2π $-\pi$ π 2π

(d)



27.

(a) $1080^\circ = 6\pi$ rad.

(b)

(c) $-735^\circ = -\dfrac{49\pi}{12}$ rad.

28.

(a) $3\,\text{rad} = \dfrac{540^\circ}{\pi}$.

(b)

(c) $-\dfrac{13\pi}{12}\,\text{rad} = -195^\circ$.

29.