Lista 10 de CM300

1. Converta de graus para radianos:

(a) $30°$ (b) $10°$ (c) $45°$ (d) $135°$ (e) $170°$

(f) $270°$ (g) $15°$ (h) $700°$ (i) $1080°$ (j) $36°$

2. Converta de radianos para graus:

(a) $\frac{5\pi}{3}$ (b) $\frac{\pi}{2}$ (c) 3π (d) $\frac{\pi}{36}$ (e) 10π (f) $\frac{3\pi}{2}$

3. Em cada item, alguns elementos de um triângulo retângulo têm suas medidas especificadas. Encontre a medida do elemento solicitado.

(a) Um dos ângulos mede $\theta = \frac{\pi}{6}$ e o menor cateto mede $c = 4$. Quanto mede a hipotenusa H?

(b) Um dos ângulos mede $\theta = \frac{\pi}{3}$ e a hipotenusa mede $H = 2$. Quanto mede o menor cateto c?

(c) Um dos ângulos mede $\theta = \frac{\pi}{4}$ e a hipotenusa mede $H = 4$. Quanto mede o maior cateto C?

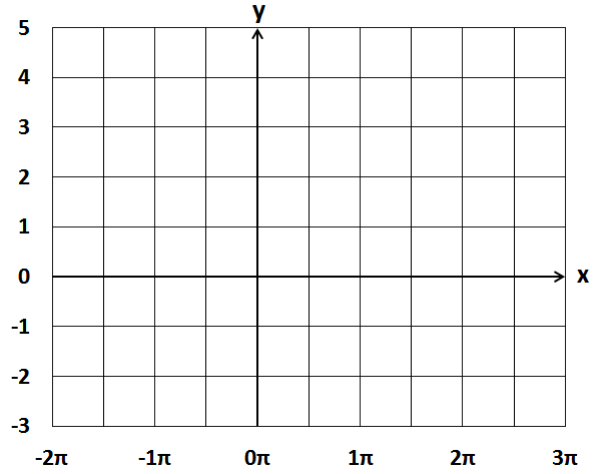
(d) Um dos catetos mede $\sqrt{6}$ e a hipotenusa mede $H = 2\sqrt{2}$. Quanto mede o ângulo θ oposto a esse cateto?

(e) Um dos catetos mede $6\sqrt{6}$ e a hipotenusa mede $H = 12\sqrt{3}$. Quanto mede o ângulo θ adjacente a esse cateto?

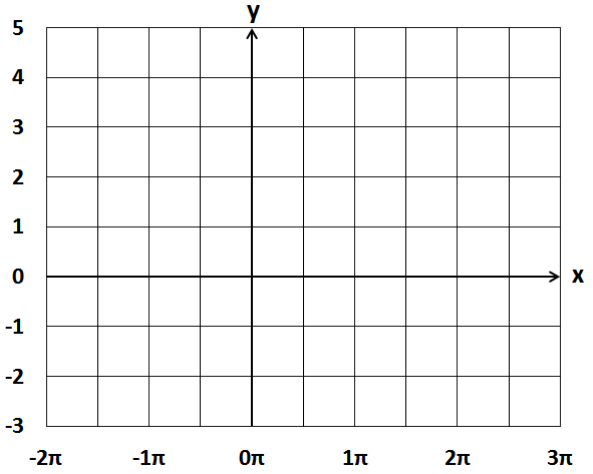
(f) Um dos ângulos mede $\theta = \frac{\pi}{6}$ e o menor cateto mede $c = 4$. Quanto mede o maior cateto C?

4. Esboce os gráficos das funções abaixo.

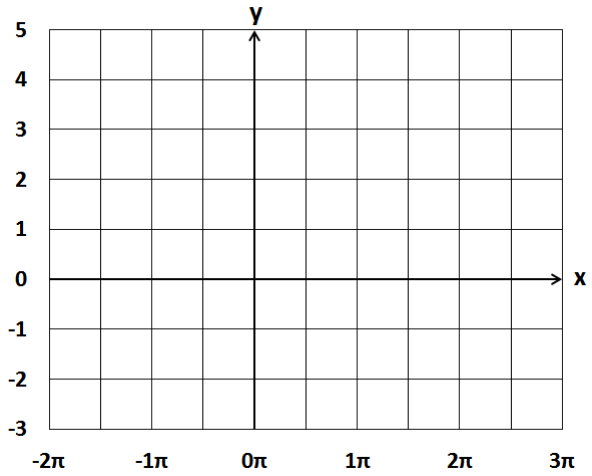
(a) $f(x) = \operatorname{sen} x$



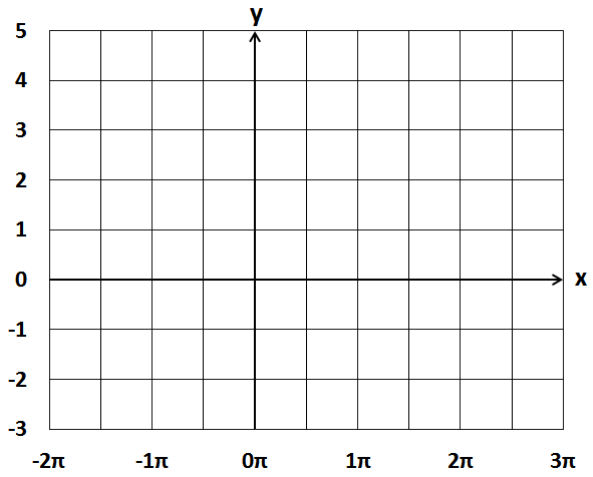
(b) $f(x) = \cos x$



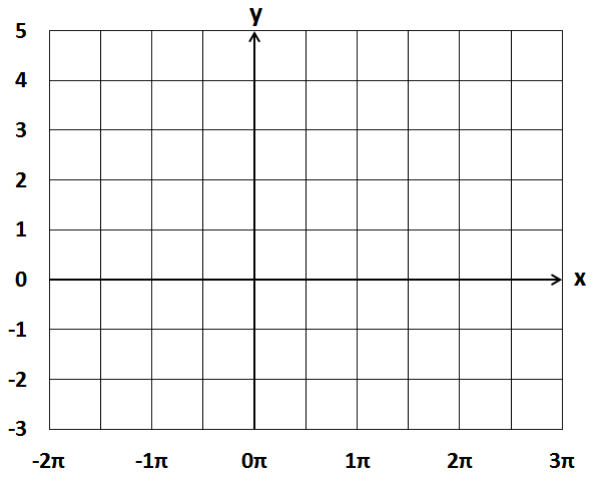
(c) $f(x) = \operatorname{sen}\left(x + \dfrac{\pi}{2}\right)$



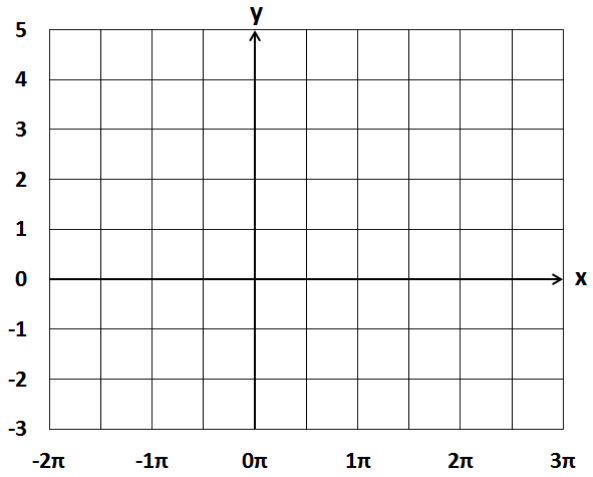
(f) $f(x) = 2\cos(x + \pi)$



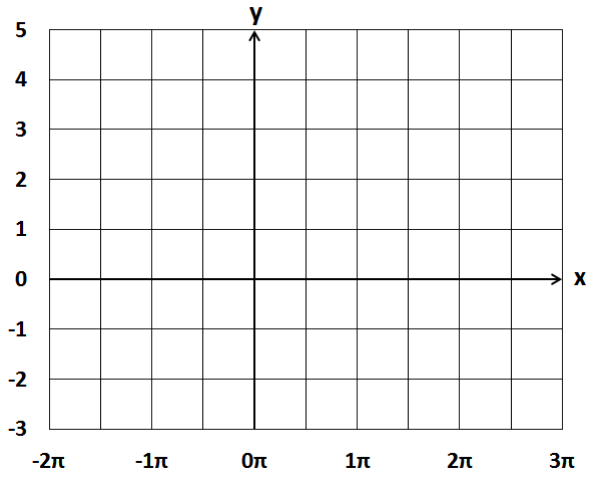
(d) $f(x) = \cos 2x$



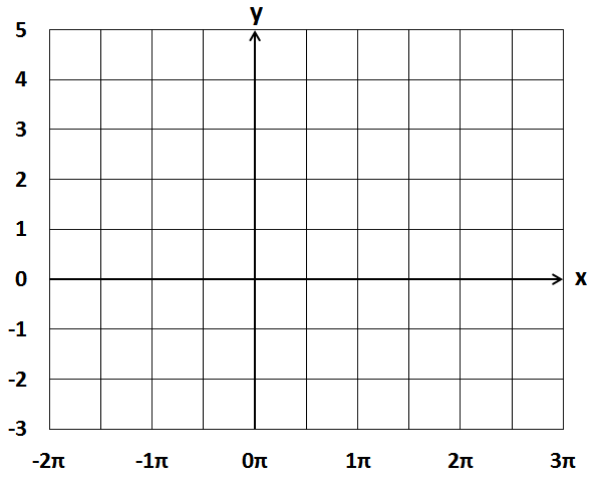
(g) $f(x) = \operatorname{sen}\dfrac{x}{2} - 1$



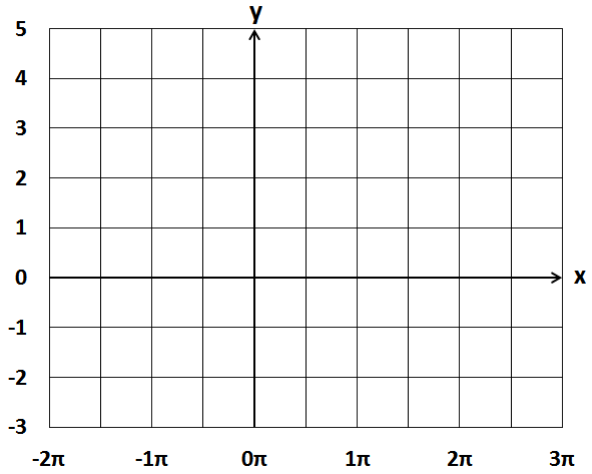
(e) $f(x) = -\operatorname{sen} x + 1$



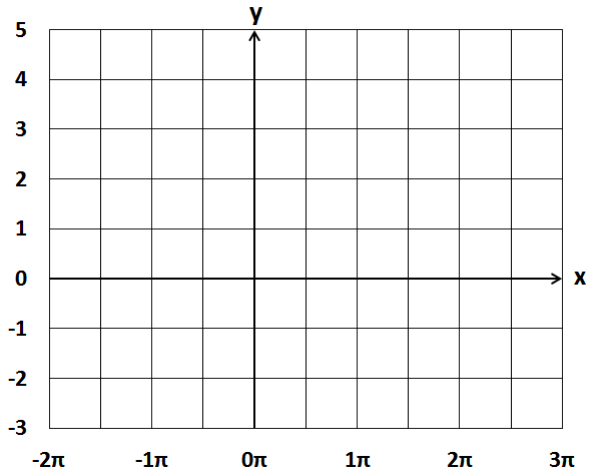
(h) $f(x) = -3\cos x + 2$



(i) $f(x) = \dfrac{\operatorname{sen} x}{2}$



(j) $f(x) = \cos\left(x - \dfrac{\pi}{2}\right) + 2$



5. Em cada item, calcule $\operatorname{sen}\theta$, $\cos\theta$ e $\operatorname{tg}\theta$.

(a) $\theta = -\dfrac{3\pi}{4}$ (b) $\theta = \dfrac{11\pi}{2}$ (c) $\theta = -\dfrac{2\pi}{3}$ (d) $\theta = \dfrac{7\pi}{6}$

(e) $\theta = \dfrac{13\pi}{2}$ (f) $\theta = 3\pi$ (g) $\theta = \dfrac{7\pi}{4}$ (h) $\theta = \dfrac{17\pi}{4}$

(i) $\theta = \dfrac{5\pi}{6}$ (j) $\theta = \dfrac{7\pi}{3}$ (k) $\theta = \dfrac{-3\pi}{2}$ (l) $\theta = \dfrac{19\pi}{4}$

(m) $\theta = \dfrac{13\pi}{6}$ (n) $\theta = \dfrac{8\pi}{3}$ (o) $\theta = \dfrac{-11\pi}{6}$ (p) $\theta = -8\pi$

6. Derive as funções abaixo.

(a) $f(x) = \operatorname{sen} x - 2\cos x$

(b) $g(x) = 3\operatorname{sen} x + \cos\dfrac{x}{2}$

(c) $h(x) = -2\operatorname{sen} 2x - 3\cos 3x + \operatorname{sen} x$

(d) $\omega(x) = \dfrac{1}{3}\operatorname{sen}\left(x + \dfrac{\pi}{2}\right) + \dfrac{1}{4}\cos\left(x + \dfrac{\pi}{2}\right)$

(e) $v(x) = 3\operatorname{sen}(2x+5) - 4\cos(-x+2) + 2\cos(-3x)$

(f) $\alpha(x) = -\dfrac{2}{5}\operatorname{sen} 3x + \dfrac{4}{3}\cos 5x - \cos x + 1$

(g) $\beta(z) = 4\cos\left(\pi z + \dfrac{\pi}{3}\right)$

(h) $\lambda(x) = 3\operatorname{sen}\left(-\dfrac{\pi x}{2}\right) + 2\cos\left(-\dfrac{\pi x}{3}\right) + x$

(i) $\mu(t) = \cos t + 2\cos 2t + 3\cos 3t$

(j) $q(t) = \operatorname{sen}(t+1) - 2\operatorname{sen}(t+4) + 3\operatorname{sen}(t+8)$

7. Encontre a equação da reta tangente ao gráfico da função f no ponto de abscissa x_0. Dê sua resposta de forma exata e também aproximada com 2 casas decimais (utilize uma calculadora).

(a) $f(x) = \operatorname{sen} x; \quad x_0 = \pi$

(b) $f(x) = \cos x; \quad x_0 = \dfrac{\pi}{3}$

(c) $f(x) = \operatorname{sen} \dfrac{x}{2}; \quad x_0 = -\pi$

(d) $f(x) = -\cos\left(x + \dfrac{\pi}{2}\right); \quad x_0 = \dfrac{\pi}{4}$

(e) $f(x) = 2\operatorname{sen} x; \quad x_0 = \dfrac{\pi}{3}$

(f) $f(x) = \cos \dfrac{\pi x}{3} + 3; \quad x_0 = 6$

(g) $f(x) = \operatorname{sen} 2x + \cos 2x; \quad x_0 = \dfrac{\pi}{2}$

(h) $f(x) = \cos x - \cos 2x; \quad x_0 = \dfrac{\pi}{2}$

(i) $f(x) = \operatorname{sen} \pi x - \operatorname{sen} 2\pi x; \quad x_0 = \dfrac{3}{2}$

(j) $f(x) = 4\cos x; \quad x_0 = -\dfrac{3\pi}{4}$

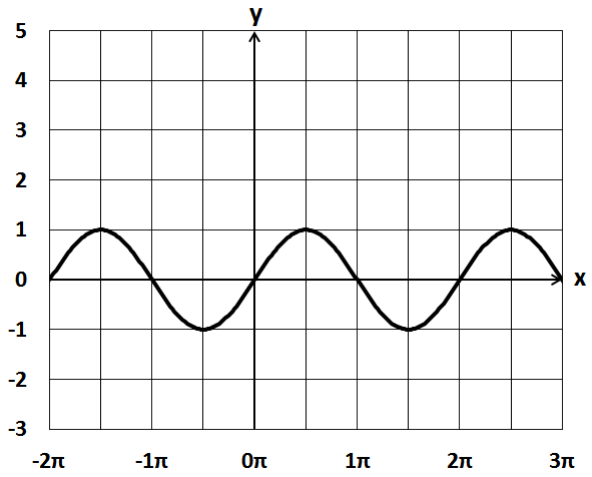
Respostas:

1. (a) $\dfrac{\pi}{6}$ (b) $\dfrac{\pi}{18}$ (c) $\dfrac{\pi}{4}$ (d) $\dfrac{3\pi}{4}$ (e) $\dfrac{17\pi}{18}$ (f) $\dfrac{3\pi}{2}$ (g) $\dfrac{\pi}{12}$ (h) $\dfrac{70\pi}{18}$ (i) 6π (j) $\dfrac{\pi}{5}$

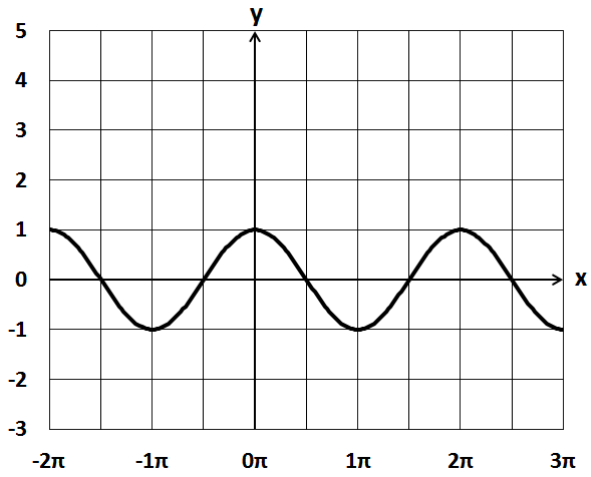
2. (a) 3900° (b) 90° (c) 540° (d) 5° (e) 1800° (f) 270°

3. (a) $H = 8$. (b) $c = 1$. (c) $C = 2\sqrt{2}$. (d) $\theta = \dfrac{\pi}{3}$. (e) $\theta = \dfrac{\pi}{4}$ (f) $C = 4\sqrt{3}$.

4. (a)



(b)



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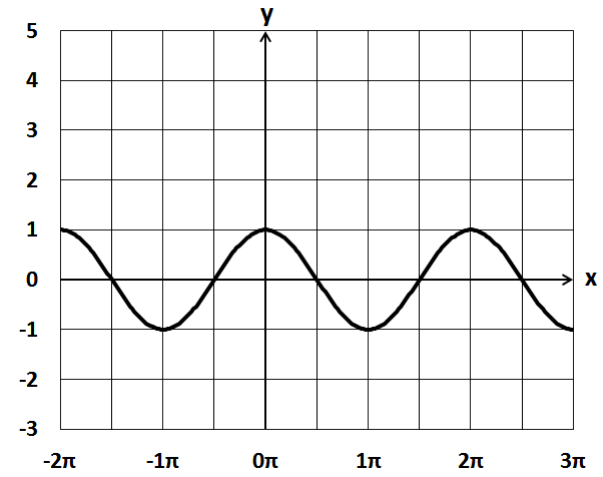
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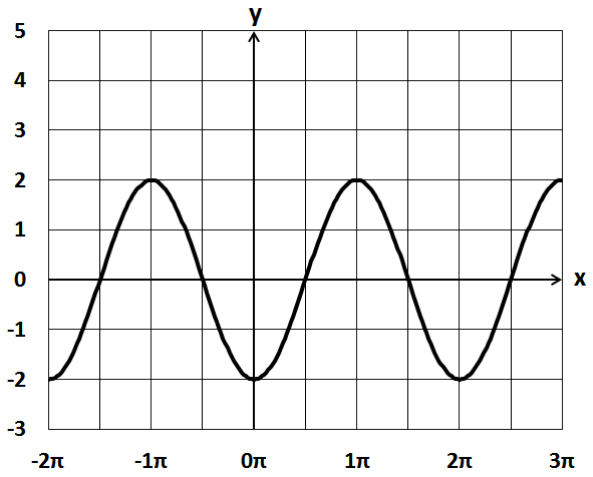
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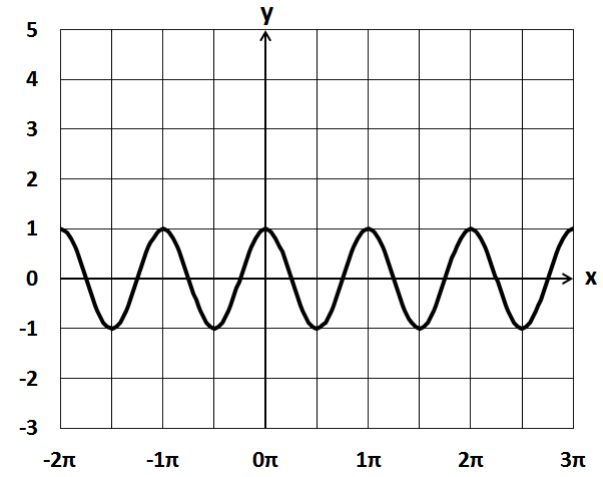
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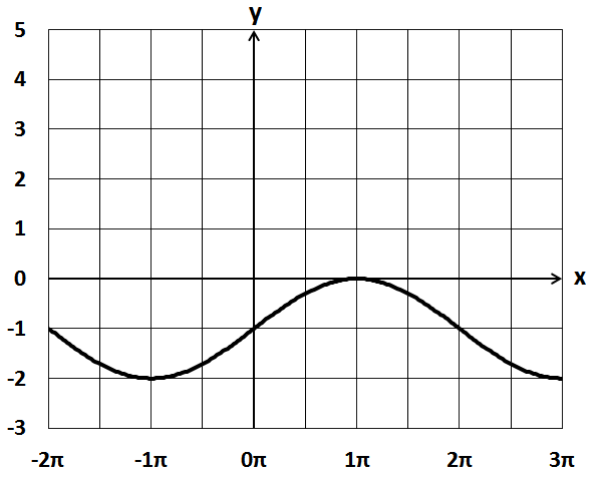
(g)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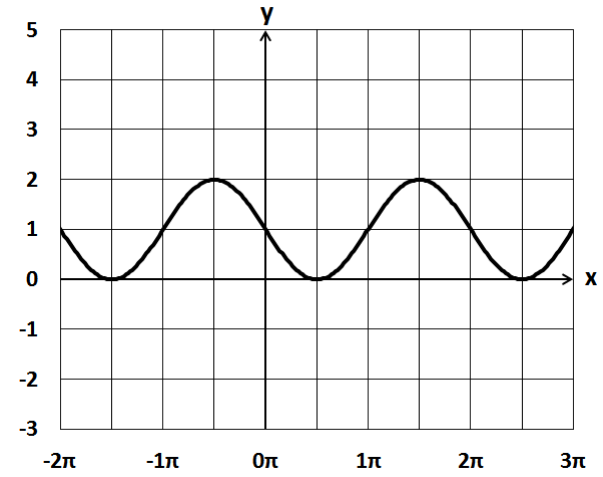
(e)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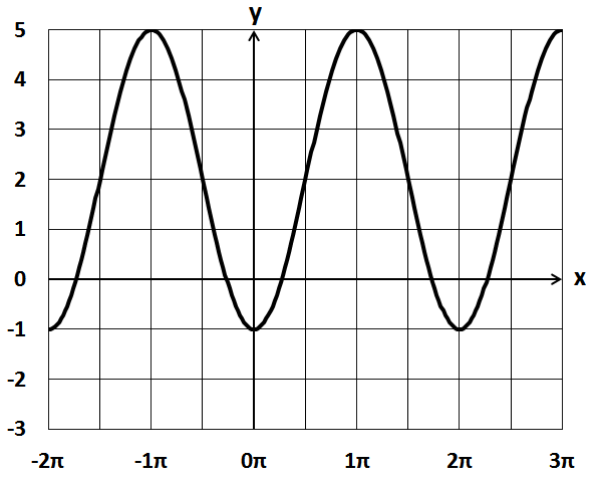
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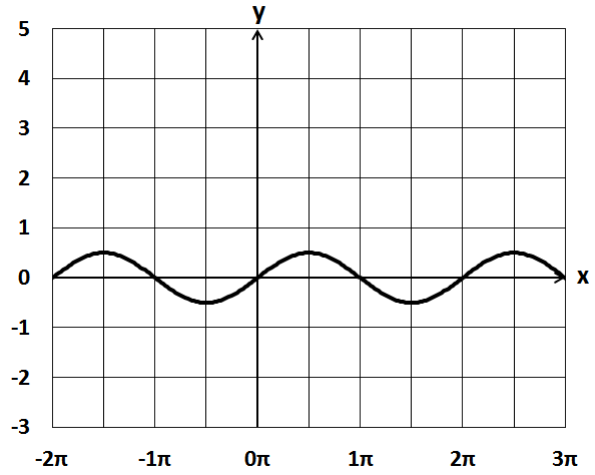
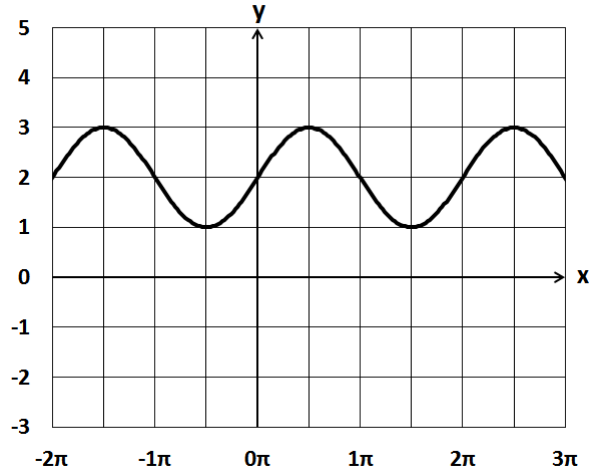
(i)



(j)



5. (a) $\operatorname{sen}\theta = -\dfrac{\sqrt{2}}{2}, \cos\theta = -\dfrac{\sqrt{2}}{2}, \operatorname{tg}\theta = 1$

(b) $\operatorname{sen}\theta = -1, \cos\theta = 0, \operatorname{tg}\theta = \nexists\, \mathbb{R}$

(c) $\operatorname{sen}\theta = -\dfrac{\sqrt{3}}{2}, \cos\theta = -\dfrac{1}{2}, \operatorname{tg}\theta = \sqrt{3}$

(d) $\operatorname{sen}\theta = -\dfrac{1}{2}, \cos\theta = -\dfrac{\sqrt{3}}{2}, \operatorname{tg}\theta = \dfrac{\sqrt{3}}{3}$

(e) $\operatorname{sen}\theta = 1, \cos\theta = 0, \operatorname{tg}\theta \notin \mathbb{R}$

(f) $\operatorname{sen}\theta = 0, \cos\theta = -1, \operatorname{tg}\theta = 0$

(g) $\operatorname{sen}\theta = -\dfrac{\sqrt{2}}{2}, \cos\theta = \dfrac{\sqrt{2}}{2}, \operatorname{tg}\theta = -1$

(h) $\operatorname{sen}\theta = \dfrac{\sqrt{2}}{2}, \cos\theta = \dfrac{\sqrt{2}}{2}, \operatorname{tg}\theta = 1$

(i) $\operatorname{sen}\theta = \dfrac{1}{2}, \cos\theta = -\dfrac{\sqrt{3}}{2}, \operatorname{tg}\theta = -\dfrac{\sqrt{3}}{3}$

(j) $\operatorname{sen}\theta = \dfrac{\sqrt{3}}{2}, \cos\theta = \dfrac{1}{2}, \operatorname{tg}\theta = \sqrt{3}$

(k) $\operatorname{sen}\theta = 1, \cos\theta = 0, \operatorname{tg}\theta \notin \mathbb{R}$

(l) $\operatorname{sen}\theta = \dfrac{\sqrt{2}}{2}, \cos\theta = -\dfrac{\sqrt{2}}{2}, \operatorname{tg}\theta = -1$

(m) $\operatorname{sen}\theta = \dfrac{1}{2}, \cos\theta = \dfrac{\sqrt{3}}{2}, \operatorname{tg}\theta = \dfrac{\sqrt{3}}{3}$

(n) $\operatorname{sen}\theta = \dfrac{\sqrt{3}}{2}, \cos\theta = -\dfrac{1}{2}, \operatorname{tg}\theta = -\sqrt{3}$

(o) $\operatorname{sen}\theta = \dfrac{1}{2}, \cos\theta = \dfrac{\sqrt{3}}{2}, \operatorname{tg}\theta = \dfrac{\sqrt{3}}{3}$

(p) $\operatorname{sen}\theta = 0, \cos\theta = 1, \operatorname{tg}\theta = 0$

6. (a) $f'(x) = \cos x + 2\operatorname{sen} x$

(b) $g'(x) = 3\cos x - \dfrac{1}{2}\operatorname{sen}\dfrac{x}{2}$

(c) $h'(x) = -4\cos 2x + 9\operatorname{sen} 3x + \cos x$

(d) $\omega'(x) = \dfrac{1}{3}\cos\left(x + \dfrac{\pi}{2}\right) - \dfrac{1}{4}\operatorname{sen}\left(x + \dfrac{\pi}{2}\right)$

(e) $v'(x) = 6\cos(2x+5) - 4\operatorname{sen}(-x+2) + 6\operatorname{sen}(-3x)$

(f) $\alpha'(x) = -\dfrac{6}{5}\cos 3x - \dfrac{20}{3}\operatorname{sen} 5x + \operatorname{sen} x$

(g) $\beta'(z) = -4\pi\operatorname{sen}\left(\pi z + \dfrac{\pi}{3}\right)$

(h) $\lambda'(x) = -\dfrac{3\pi}{2}\cos\left(-\dfrac{\pi x}{2}\right) + \dfrac{2\pi}{3}\operatorname{sen}\left(-\dfrac{\pi x}{3}\right) + 1$

(i) $\mu'(t) = -\operatorname{sen} t - 4\operatorname{sen} 2t - 9\operatorname{sen} 3t$

(j) $q'(t) = \cos(t+1) - 2\cos(t+4) + 3\cos(t+8)$

7. (a) $y = -x + \pi \approx -x + 3,14$

(b) $y = -\dfrac{\sqrt{3}x}{2} + \dfrac{\sqrt{3}\pi}{6} + \dfrac{1}{2} \approx -0,67x + 1,41$

(c) $y = -1$

(d) $y = \dfrac{\sqrt{2}x}{2} - \dfrac{\sqrt{2}\pi}{8} + \dfrac{\sqrt{2}}{2} \approx 0,71x + 0,15$

(e) $y = x - \dfrac{\pi}{3} + \sqrt{3} \approx x + 0,68$

(f) $y = 4$

(g) $y = -2x + \pi - 1 \approx -2x + 2,14$

(h) $y = -x + \dfrac{\pi}{2} + 1 \approx -x + 2,57$

(i) $y = 2\pi x - 3\pi - 1 \approx 6,28x - 10,42$

(j) $y = 2\sqrt{2} + \dfrac{3\sqrt{2}}{2} - 2\sqrt{2} \approx 2,83x + 3,84$