CM201 - Cálculo Diferencial e Integral I
Lista de Exercícios 3

1. Em cada item, calcule quando possível o valor da função nos pontos x dados.

   (a) $f(x) = 3x^2 - 4x + 1, \qquad x = 2,\ x = -\dfrac{1}{2},\ x = \sqrt{3}.$

   (b) $g(x) = \sqrt{x^2 - 4}, \qquad x = 0,\ x = 2,\ x = -3.$

   (c) $h(x) = \dfrac{1}{x+1}, \qquad x = -\dfrac{4}{3},\ x = 0,\ x = -1.$

2. Encontre a função do primeiro grau que passa pelos pontos indicados.

   (a) $(6, 3)$ e $(-3, -3)$. (b) $(1, -11)$ e $(-5, -5)$. (c) $(2, -3)$ e $(1/2, 0)$.

   (d) $(2, 0)$ e $(-2, 1)$. (e) $(1, -1)$ e $(3, 5)$. (f) $(-1/2, 3)$ e $(1/2, 1)$.

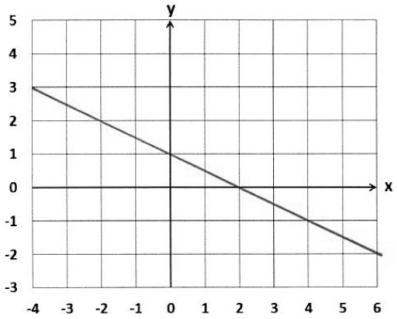
3. Esboce o gráfico das funções do primeiro grau abaixo e classifique-as em crescente e decrescente.

   (a) $f(x) = 3x + 2$. (b) $g(x) = \dfrac{x}{2} - 1$. (c) $h(x) = -\dfrac{x}{3} + 2$. (d) $w(x) = -x$.

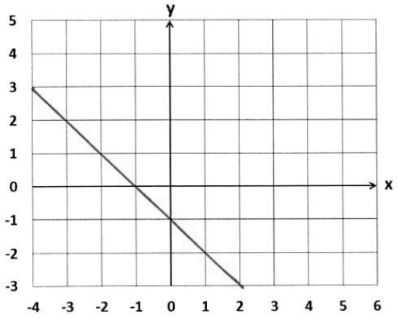
   (e) $\theta(x) = -2x + \dfrac{1}{2}$. (f) $\xi(x) = x + 3$.

4. Encontre as funções do primeiro grau cujos gráficos estão representados abaixo.

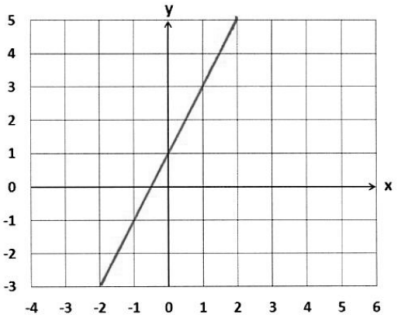
(a)



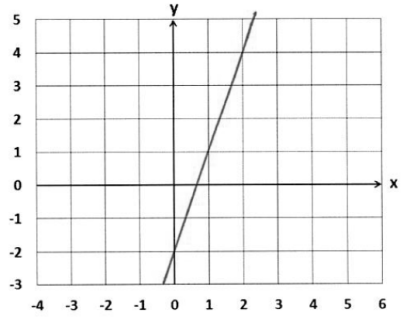
(c)



(b)



(d)



5. Esboce os gráficos das funções do segundo grau que se seguem. Indique as coordenadas do vértice e os intervalos em cada função é crescente e decrescente,

   (a) $f(x) = x^2 - x - 2$ (b) $g(x) = x^2 - 3$ (c) $h(x) = -2x^2 + 9x - 7$ (d) $w(x) = \dfrac{x^2}{2} - x + 1$

   (e) $v(x) = x^2 - 5x + 6$ (f) $u(x) = -\dfrac{x^2}{4} + \dfrac{x}{2} + 2$

Respostas:

1. (a) $f(2) = 5$, $f\left(-\dfrac{1}{2}\right) = \dfrac{15}{4}$ e $f(\sqrt{3}) = 10 - 4\sqrt{3}$.

   (b) Não existe $g(0)$, $g(2) = 0$, $g(-3) = \sqrt{5}$.

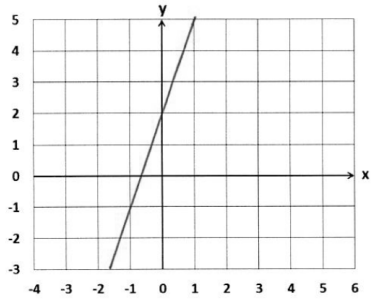
   (c) $h\left(-\dfrac{4}{3}\right) = -3$, $h(0) = 1$, não existe $h(-1)$.

2. (a) $f(x) = \dfrac{2x}{3} - 1$ (b) $f(x) = -x - 10$ (c) $f(x) = -2x + 1$

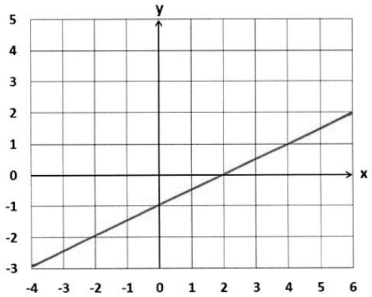
   (d) $f(x) = -\dfrac{x}{4} + \dfrac{1}{2}$ (e) $f(x) = 3x - 4$ (f) $f(x) = -2x + 2$

3. (a),(b),(f): crescentes; (c),(d),(e): decrescentes

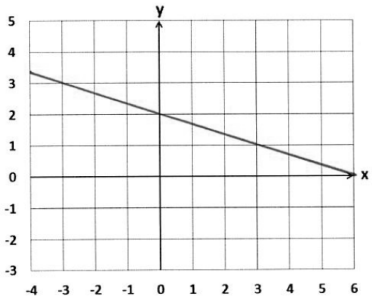
(a)



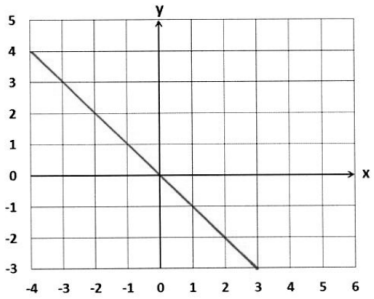
(b)



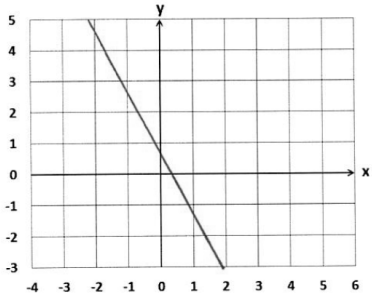
(c)



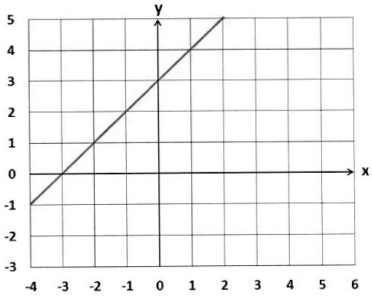
(d)



(e)



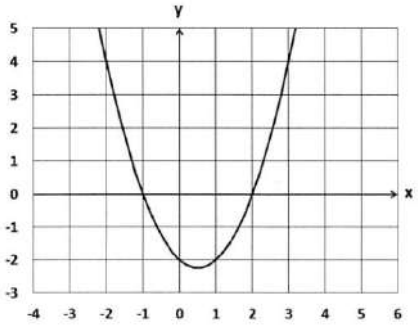
(f)



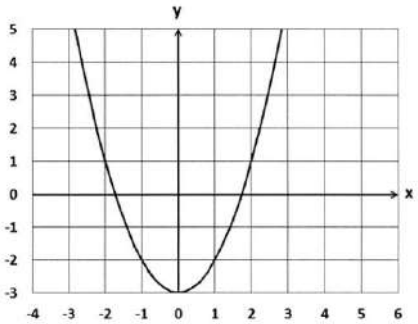
4. (a) $f(x) = -\dfrac{x}{2} + 1$. (b) $f(x) = 2x + 1$. (c) $f(x) = -x - 1$. (d) $f(x) = 3x - 2$.

5.

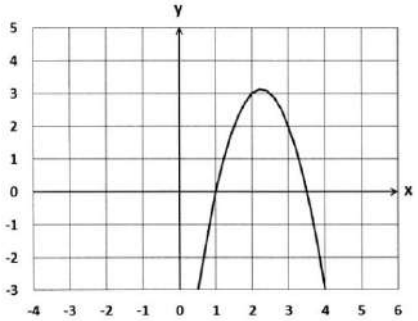
(a) Vértice: $\left(\frac{1}{2}, -\frac{9}{4}\right)$. Função crescente para $x \in \left]\frac{1}{2}, \infty\right[$, decrescente para $x \in \left]-\infty, \frac{1}{2}\right[$.



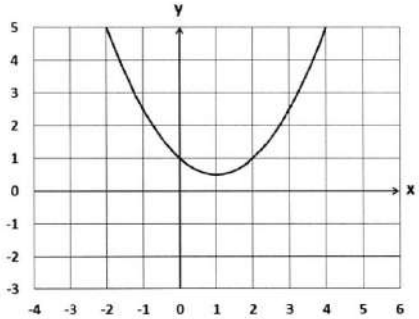
(b) Vértice: $(0, -3)$. Função crescente para $x \in]0, \infty[$, decrescente para $x \in]-\infty, 0[$.



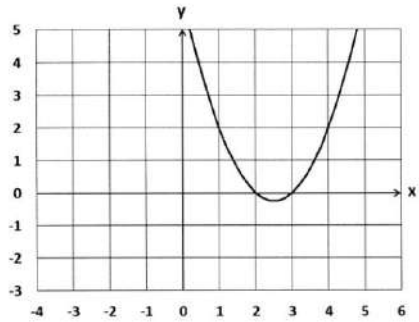
(c) Vértice: $\left(\frac{9}{4}, \frac{25}{8}\right)$. Função crescente para $x \in \left]-\infty, \frac{9}{4}\right[$, decrescente para $x \in \left]\frac{9}{4}, \infty\right[$.



(d) Vértice: $\left(1, \frac{1}{2}\right)$. Função crescente para $x \in]1, \infty[$, decrescente para $x \in]-\infty, 1[$.



(e) Vértice: $\left(\frac{5}{2}, -\frac{1}{4}\right)$. Função crescente para $x \in \left]\frac{5}{2}, \infty\right[$ e decrescente para $x \in \left]-\infty, \frac{5}{2}\right[$.



(f) Vértice: $\left(1, \frac{9}{4}\right)$. Função crescente para $x \in]-\infty, 1[$, decrescente para $x \in]1, \infty[$.