1. Dapatkan koordinat titik maximum/minimum dan plot sketsa grafik dari: $f(x) = 2x^2 + 8x + 6$

   $x = -\frac{b}{2a}$

   $x = -\frac{8}{2 \times 2}$

   $x = -2$

   $f(x) = 2x^2 + 8x + 6, x = -2$

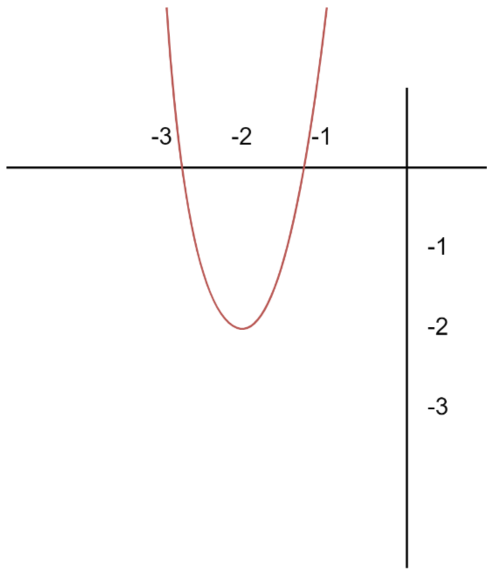
   $f(-2) = 2(-2)^2 + 8(-2) + 6$

   $f(-2) = 8 - 16 + 6$

   $y = -2$

   $(\mathbf{-2, -2})$ **← Titik Max/Min**

   Grafik:



2. Hitunglah hasil kali akar-akar persamaan $6x^2 - 2x + 3 = 0$.

   $x1 \,.\, x2 = \frac{c}{a}$

   $x1 \,.\, x2 = \frac{3}{6}$

   $x1 \,.\, x2 = \frac{1}{2} \leftarrow \mathbf{Hasil}$

3. Tentukan persamaan kuadrat yang akar-akarnya $\frac{m}{n}+\frac{n}{m}$, jika diketahui akar − akar persamaan kuadrat $2x^2 - 4x + 1 = 0$ adalah m dan n.

$$m \times n = \frac{c}{a} = \frac{1}{2}$$

$$m + n = \frac{-b}{a} = \frac{4}{2} = 2$$

$$\frac{m}{n}+\frac{n}{m} = \frac{m^2+n^2}{nm} = \frac{(m+n)^2-2mn}{nm} = \frac{(2)^2-2\left(\frac{1}{2}\right)}{1/2} = 6$$

$$\frac{m}{n}\times\frac{n}{m} = \frac{mn}{nm} = \frac{1/2}{1/2} = 1$$

$Kuadrat\ Baru$:

$$x^2-(m+n)x+m.n$$

$$x^2-6x+1$$

4. Jika $f(x) = x^2 + 2$ dan $g(x) = \sqrt{x-1}$, maka carilah daerah asal fungsi $(fog)(x)$.

$$(fog)(x) = f\big(g(x)\big)$$

$$= \left(\sqrt{x-1}\right)^2 + 2$$

$$= x - 1 + 2$$

$$= x + 1$$

5. Misalkan $f: R \to R, g: R \to R,$ dan $f(x) = x + 2,$ dan $(gof)(x) = 2x^2 + 4x - 6.$ Misalkan juga x_1 dan x_2 adalah akar-akar dari $g(x) = 0$, tentukan $x_1 + 2x_2$.

$$f(x) = x + 2$$

$$gof(x) = 2x^2 + 4x - 6$$

$$g\big(f(x)\big) = 2x^2 + 4x - 6$$

$$g(x+2) = 2x^2 + 4x - 6$$

$$g(x) = \frac{2x^2+4x-6}{x+2}$$

$$0 = \frac{2x^2+4x-6}{x+2}$$

$$\frac{2x^2+4x-6}{x+2} = 0$$

$$2x^2 + 4x - 6 = 0 \leftarrow Dibagi\ 2$$

$$x^2 + 2x - 3 = 0$$

$$x \times (x+3) - (x+3) = 0$$

$$(x+3) \times (x-1) = 0$$

$$x + 3 = 0 \to x_1 = -3$$

$$x - 1 = 0 \to x_2 = 1$$

$$x_1 + 2x_2 = -3 + 2(1) = -1$$

6. Jika $f^{-1}(x)$ merupakan invers dari fungsi $f(x) = \frac{2x-4}{x-3}$. Tentukan nilai $f^{-1}(4)$.

$$f(x) = \frac{2x-4}{x-3}$$

$$y = \frac{2x-4}{x-3}$$

$$x = \frac{2y-4}{y-2}$$

$$2y - 4 = (y-3)x$$

$$2y - 4 = xy - 3x$$

$$2y - xy = -3x + 4$$

$$(2-x)y = -3x + 4$$

$$y = \frac{-3x+4}{2-x}$$

$$f^{-1} = \frac{-3x+4}{2-x}$$

$$f^{-1}(4) = \frac{-3x+4}{2-x}$$

$$f^{-1}(4) = \frac{-3x+4}{2-x}$$

$$f^{-1}(4) = \frac{-3(4)+4}{2-(4)}$$

$$f^{-1}(4) = \frac{-8}{-2}$$

$$f^{-1}(4) = 4$$

7. Tentukan koordinat titik pusat elips $7x^2 + 16y^2 - 28x + 96y + 60 = 0$.

$$7x^2 + 16y^2 - 28x + 96y + 60 = 0$$

$$7x^2 + 16y^2 - 28x + 96y = -60$$

$$7(x^2 - 4x) + 16y^2 + 96y = -60$$

$$7(x^2 - 4x + 4) + 16y^2 + 96y$$

$$= -60 + 7 \times 4$$

$$7(x-2)^2 + 16y^2 + 96y = -32$$

$$7(x-2)^2 + 16(y^2 + 6y) = -32$$

$$7(x-2)^2 + 16(y^2 + 6y + 9)$$

$$= -32 + 16 \times 9$$

$$7(x-2)^2 + 16(y+3)^2 = 112$$

$$\frac{(x-2)^2}{16} + \frac{(y+3)^2}{7} = 1$$

$$\frac{(x-2)^2}{4^2} + \frac{\left(y-(-3)\right)^2}{\sqrt{7}^2} = 1$$

$\boldsymbol{Maka, titik\ pusat\ elips} \rightarrow (2, -3)$

8. Dapatkan harga limit berikut:

a. $\lim\limits_{x\to\infty} \frac{3x^4+2x^3-5x+4}{2x^3-4x^2+9}$

$$\lim_{x\to\infty}\left(\frac{x^3\left(3x+2-\frac{5}{x^2}+\frac{4}{x^3}\right)}{x^3\left(2-\frac{4}{x}+\frac{9}{x^3}\right)}\right)$$

$$\lim_{x\to\infty}\left(\frac{3x+2-\frac{5}{x^2}+\frac{4}{x^3}}{2-\frac{4}{x}+\frac{9}{x^3}}\right)$$

$$\lim_{x\to\infty}\left(3x+2-\frac{5}{x^2}+\frac{4}{x^3}\right)=\infty$$

$$\lim_{x\to\infty}\left(2-\frac{4}{x}+\frac{9}{x^3}\right)=2$$

Karena pernyataan $\frac{+\infty}{a}, a > 0$ terdefinisi sebagai $+\infty$, limit sama dengan $+\infty$

b. $\lim\limits_{x\to\infty}\left(\sqrt{9x^2+3x}-\sqrt{9x^2-5x}\right)$

$$\lim_{x\to\infty}\left(\sqrt{9x^2+3x}-\sqrt{9x^2-5x}\times\frac{\sqrt{9x^2+3x}-\sqrt{9x^2-5x}}{\sqrt{9x^2+3x}-\sqrt{9x^2-5x}}\right)$$

$$\lim_{x\to\infty}\left(\frac{9x^2+3x-9x^2+5x}{\sqrt{9x^2+3x}+\sqrt{9x^2-5x}}\right)$$

$$\lim_{x\to\infty}\left(\frac{8x}{x\left(\sqrt{9+\frac{3}{x}}+\sqrt{9-\frac{5}{x}}\right)}\right)$$

$$\lim_{x\to\infty}\left(\frac{8}{\left(\sqrt{9+\frac{3}{x}}+\sqrt{9-\frac{5}{x}}\right)}\right)$$

$$\frac{8}{\sqrt{9+3\times 0}+\sqrt{9-5\times 0}}$$

$$\frac{8}{6}=\mathbf{\frac{4}{3}}\leftarrow \boldsymbol{Hasil\ limit}$$

c. $\lim_{x \to \infty} \frac{\sin 6x}{tg\ 3x}$

$$\frac{1}{tg\ 3x} \lim_{x \to \infty} \frac{\sin 6x}{x}$$

$$\frac{1}{tg\ 3x} \times 0$$

$$0 \leftarrow Hasil\ limit.$$