Willkommen zu Tag 4!

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Bestimme alle Asymptoten

$$f(x) = \frac{x-3}{x^2-4}, \quad g(x) = \frac{x(2x-1)}{(3x+1)(5x+7)}$$

Ableiten

$$f(x) = \ln(x)(x^2-1), \quad g(x) = \sqrt{\mathrm{e}^{x^3+x^2}}, \quad h(x) = \frac{4\pi}{3\sqrt{x^2-4}}$$

Tangenten

$$f(x) = x^3 - 2x + 2, P(1|1), \quad g(x) = x^4 - 4x^2, m = 0$$

Integrale

$$\int \frac{1}{2\sqrt{x-7}} dx, \quad \int \frac{3x^2-7}{x^3-7x+3} dx, \quad \int \frac{1}{\ln(x)\cdot x} dx, \quad \int \tan x dx$$

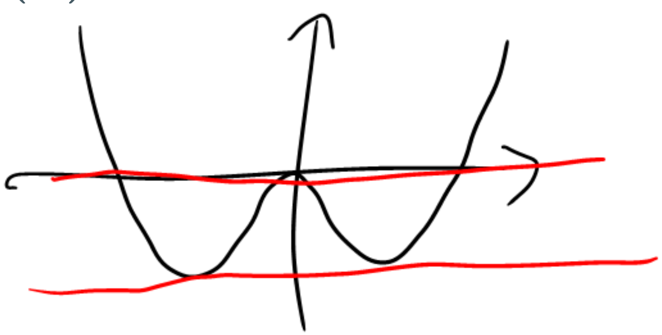
Fläche zwischen $f(x) = x^3 - 5x$ und $g(x) = -x$

Lösungen

$$2\mathrm{e}^{2x} - 8\mathrm{e}^{3x} = 0 \implies x = -2\ln(2)$$
$$\ln(\mathrm{e}^{2x} + \mathrm{e}^{4x}) = \ln(2\mathrm{e}^{2x}) \implies x = 0$$
$$\sqrt{x^4 - 5} - x^2 + 2 = 0 \implies x_1 = 1.5, x_2 = -1.5$$

$$f(x) = \sin(x)(x^2 - 1) \implies f'(x) = \sin x \cdot 2x + \cos x(x^2 - 1)$$
$$g(x) = \cos(\mathrm{e}^{x^3+x^2}) \implies g'(x) = -\sin(\mathrm{e}^{x^3+x^2})\mathrm{e}^{x^3+x^2}(3x^2 + 2x)$$
$$h(x) = \frac{4\pi}{3\sqrt{x^2-4}} \implies h'(x) = -\frac{4\pi}{2}x(x^2 - 4)^{-\frac{3}{2}}$$

$$f(x) = x^3 - 2x + 2, P(1|1) \implies y = x$$
$$g(x) = x^4 - 4x^2, m = 0 \implies y_1 = 0, y_2 = -4$$



$$\int \frac{1}{2\sqrt{x-7}} dx = (x-7)^{\frac{1}{2}} + C$$
$$\int \frac{3x^2-7}{x^3-7x+3} dx = \ln(x^3-7x+3) + C$$
$$\int \frac{1}{\ln(x)\cdot x} dx = \ln(\ln x) + C$$
$$\int \tan x dx = -\ln(\cos x) + C$$

Fläche zwischen $f(x) = x^3 - 5x$ und $g(x) = -x$: $A = 8$

$$\int \frac{1}{2\sqrt{x-7}}dx, = \int \frac{1}{2} \cdot \frac{1}{\sqrt{x-7}}\, dx =$$

$$\frac{1}{2}\int (x-7)^{-\frac{1}{2}}\, dx = \frac{1}{2}\, \frac{1}{\frac{1}{2}}\, (x-7)^{\frac{1}{2}} \cdot \frac{1}{1} = (x-7)^{\frac{1}{2}} + C$$

$$h(x) = \frac{4\pi}{3\sqrt{x^2-4}} = \frac{4\pi}{3} \cdot \frac{1}{\sqrt{x^2-4}} = \frac{4\pi}{3} \cdot (x^2-4)^{-\frac{1}{2}}$$

$$h'(x) = \frac{4\pi}{3} \cdot \left(-\frac{1}{2}\right) (x^2-4)^{-\frac{3}{2}} \cdot (2x)$$