

INTEGRALRECHNUNG – GRUNDLAGEN

UNBESTIMMTES INTEGRAL

$$\int f(x) dx = F(x) + C$$

$$\left. \begin{array}{l} f(x) = 4x^2 + 5x - 20 \\ f(x) = 4x^2 + 5x \\ f(x) = 4x^2 + 5x + 10000 \end{array} \right\} \rightarrow f'(x) = 8x + 5$$

$$\int (8x + 5) dx = 4x^2 + 5x + ?$$

BESTIMMTES INTEGRAL

$$\int_a^b f(x) dx = F(x) \Big|_a^b = F(b) - F(a)$$

$$\int_0^4 (0,2x^3 - 2,4x^2 + 6,4x) dx = \frac{0,2x^4}{4} - \frac{2,4x^3}{3} + \frac{6,4x^2}{2} \Big|_0^4$$
$$\left(\frac{0,2 * 4^4}{4} - \frac{2,4 * 4^3}{3} + \frac{6,4 * 4^2}{2} \right) - \left(\frac{0,2 * 0^4}{4} - \frac{2,4 * 0^3}{3} + \frac{6,4 * 0^2}{2} \right) = 12,8$$

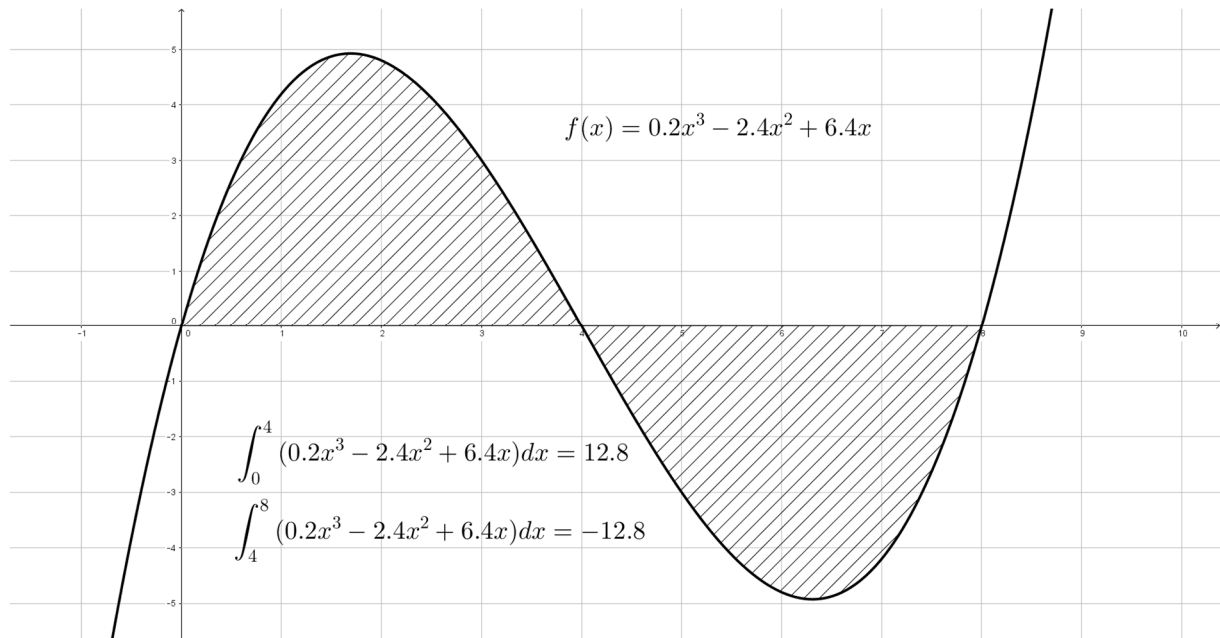
INTEGRALRECHNUNG – INTEGRALREGELN

Regel	$f(x)$	$F(x)$
Konstantenregel	$f(x) = c$	$F(x) = c * x$
Potenzregel	$f(x) = x^n$	$F(x) = \begin{cases} \frac{x^{n+1}}{n+1} & n \neq -1 \\ \ln(x) & n = -1 \end{cases}$
Exponentialregel I	$f(x) = e^x$	$F(x) = e^x$
Exponentialregel II	$f(x) = a^x$	$F(x) = \frac{a^x}{\ln(a)}$
Logarithmusregel I	$f(x) = \ln(x)$	$F(x) = x * \ln(x) - x$
Logarithmusregel II	$f(x) = {}^a\log(x)$	$F(x) = \frac{x * \ln(x) - x}{\ln(a)}$
Sinusregel	$f(x) = \sin(x)$	$F(x) = -\cos(x)$
Cosinusregel	$f(x) = \cos(x)$	$F(x) = \sin(x)$
Summenregel	$f(x) = g(x) \pm h(x)$	$F(x) = G(x) \pm H(x)$
Faktorregel	$f(x) = k * g(x)$	$F(x) = k * G(x)$
Partielle Integration	$\int (f(x) * g(x)) dx = F(x) * g(x) - \int (F(x) * g'(x)) dx$	

INTEGRALRECHNUNG – FLÄCHENBERECHNUNG

FLÄCHE ZWISCHEN FUNKTION UND X-ACHSE

$$\int_a^b f(x) dx = F(x) \Big|_a^b = F(b) - F(a)$$



FLÄCHE ZWISCHEN FUNKTION UND X-ACHSE

$$\int_a^b f(x) dx - \int_a^b g(x) dx = \int_a^b (f(x) - g(x)) dx$$

