Übungen zu Stammfunktionen

Bestimmen Sie eine zu f gehörende Stammfunktion F

Aufgabe 1	***Aufgabe 2***
a) $f(x) = 1 \Rightarrow F(x) =$ $x + c$	a) $f(x) = 3x \Rightarrow F(x) =$ $\int 3x\,dx = 3\int x\,dx = \frac{3x^2}{2} + c$
b) $f(x) = x \Rightarrow F(x) =$ $\frac{x^2}{2} + c$	b) $f(x) = \frac{1}{8}x \Rightarrow F(x) =$ $\frac{1}{8}\int x\,dx = \frac{x^2}{16} + c$
c) $f(x) = x^2 \Rightarrow F(x) =$ $\frac{x^3}{3} + c$	c) $f(x) = \sqrt{2} \cdot x \Rightarrow F(x) =$ $\frac{\sqrt{2}x^2}{2} + c$
d) $f(x) = x^3 \Rightarrow F(x) =$ $\frac{x^4}{4} + c$	d) $f(x) = -\frac{1}{2} \cdot x^3 \Rightarrow F(x) =$ $-\frac{1}{2} \cdot \frac{x^4}{4} = \frac{x^4}{8} + c$
e) $f(x) = x^4 \Rightarrow F(x) =$ $\frac{x^5}{5} + c$	e) $f(x) = (r+1)x^r \Rightarrow F(x) =$ $x^{r+1} + c$
f) $f(x) = x^r \Rightarrow F(x) =$ $\frac{x^{r+1}}{r+1} + c$	f) $f(x) = x^{-0.5r} \Rightarrow F(x) =$ $\frac{x^{-0.5r+1}}{-0.5r+1} + c$

Aufgabe 3	***Aufgabe 4***
a) $f(x) = 2x + 1 \Rightarrow F(x) =$ $x^2 + x + c$	a) $f(x) = \sqrt[3]{x} + \sqrt[4]{x} \Rightarrow F(x) =$ $\frac{x^{\frac{4}{3}}}{\frac{4}{3}} + \frac{x^{\frac{5}{4}}}{\frac{5}{4}}$
b) $f(x) = 3x^2 - 2x \Rightarrow F(x) =$ $x^3 - x^2 + c$	b) $f(x) = \frac{3}{\sqrt{x}} \Rightarrow F(x) =$
c) $f(x) = -4x^2 - x \Rightarrow F(x) =$ $-\frac{4x^3}{3} - \frac{x^2}{2} + c$	c) $f(x) = \frac{-2}{x^2} - \frac{1}{x} \Rightarrow F(x) =$
d) $f(x) = \frac{1}{2}x^3 - \frac{1}{4}x \Rightarrow F(x) =$ $\frac{x^4}{8} - \frac{x^2}{8} + c$	d) $f(x) = -3e^{-6x} \Rightarrow F(x) =$
e) $f(x) = 0.01x^3 - 0.6x^2 + 3x \Rightarrow F(x) =$ $\frac{x^4}{400} - \frac{x^3}{5} + \frac{3x^2}{2} + c$	e) $f(x) = \frac{3}{2x} \Rightarrow F(x) =$
f) $f(t) = 2\sqrt{t} \cdot x \Rightarrow F(t) =$ $2x\frac{t^{1.5}}{1.5}$	f) $f(x) = \ln(x)$ (Tipp: Produktregel anwenden) $\Rightarrow F(x) =$

Lösung 1

a) $F(x) = x + c$

b) $F(x) = \frac{x^2}{2} + c$

c) $F(x) = \frac{x^3}{3} + c$

d) $F(x) = \frac{x^4}{4} + c$

e) $F(x) = \frac{x^5}{5} + c$

f) $F(x) = \frac{x^{r+1}}{r+1} + c$

Lösung 2

a) $F(x) = \frac{3x^2}{2} + c$

b) $F(x) = \frac{x^2}{16} + c$

c) $F(x) = \frac{\sqrt{2}x^2}{2} + c$

d) $F(x) = -\frac{x^4}{8} + c$

e) $F(x) = x^{r+1} + c$

f) $F(x) = \frac{1}{1-0.5r} x^{-0.5r+1} + c$

Lösung 3

a) $F(x) = x^2 + x + c$

b) $F(x) = x^3 - x^2 + c$

c) $F(x) = -\frac{4x^3}{3} - \frac{x^2}{2} + c$

d) $F(x) = \frac{x^4}{8} - \frac{x^2}{8} + c$

e) $F(x) = \frac{x^4}{400} - \frac{x^3}{5} + \frac{3x^2}{2} + c$

f) $F(t) = \frac{4x \cdot t^{1.5}}{3} + c = \frac{4x}{3}\sqrt{t^3} + c$

Lösung 4

a) $F(x) = \frac{3\sqrt[3]{x^4}}{4} + \frac{4\sqrt[4]{x^5}}{5} + c$

b) $F(x) = 6\sqrt{x} + c$

c) $F(x) = -\ln(x) + \frac{2}{x} + c$

d) $F(x) = \frac{e^{-6x}}{2} + c$

e) $F(x) = \frac{3 \cdot \ln(x)}{2} + c$

f) $F(x) = x \cdot \ln(x) - x + c$