35te Mathe Hü am 02.03.2023

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Bsp 6.19a-d)

a) $f(x) = 4$ $\quad \int x^n d = \frac{x^{n+1}}{n+1} + C$

$\int 4dx = \underline{\underline{4x}} + C$ $\quad f(x) = 4x + 9$ $\quad f(x) = 4x + 8$

b) $f(x) = 3x^2$ $\quad \int 3x^2 dx = 3 \cdot \frac{\frac{x^3}{x+1}}{3}$

$\int 3x\,dx = \underline{x^3 + C}$

$\underline{f(x) = x^3 + 18}$

$\underline{f(x) = x^3 + 19}$

c) $f(x) = 0$ $\quad \int 0dx = \underline{\underline{0 + C}}$

d) $f(x) = 4x^3$

$\int 4x^3 dx = \cancel{4}\frac{x^4}{\cancel{4}} = \underline{\underline{x^4 + C}}$

$f(x) = x^4 + 10$ $\quad f(x) = x^4 + 11$

6.31a-c) a) $\underline{\underline{\int x\,dx = \frac{x^2}{2} + C}}$ | b) $\underline{\underline{\int t^7 dt = \frac{t^8}{8} + C}}$ | c) $\underline{\underline{\int u^4 du = \frac{u^5}{5} + C}}$

6.32a-c) a) $\int 0dx =$ | b) $\underline{\underline{\int 1\,dt = t + C}}$ | c) $\int x^{-1} dx = \int \frac{1}{x} dx = \underline{\underline{\ln|x| + C}}$

6.35a-d) a) $\int x^{-2} dx = \int \frac{1}{x^2} dx = \underline{\underline{-\frac{1}{x}}} + C$

b) $\int \frac{1}{t^3} dt = \int t^{-3} dt = \frac{t^{-2}}{-2} = \underline{\underline{-\frac{1}{2t^2} + C}}$

c) $\int x^{-6} dx = \frac{x^{-5}}{-5} = \underline{\underline{-\frac{1}{5x^5}}}$

d) $\int \frac{du}{u^5} = \int \frac{1}{u^5} \cdot \frac{du}{1} = \int u^{-5} du = \int \frac{u^{-4}}{-4} = \cancel{\frac{1}{?}}\ 1$

$\int \frac{u^{-4}}{-4} = \underline{\underline{-\frac{1}{4 \cdot u^4}}}$

6.26a-d) a) $\int x^{\frac{3}{4}} dx = \frac{x^{\frac{3}{4}+1}}{\frac{3}{4}+1} = \frac{x^{\frac{7}{4}}}{\frac{7}{4}} = \frac{4x^{\frac{7}{4}}}{7} = \underline{\underline{\frac{4 \cdot \sqrt[4]{x^7}}{7} + C}}$

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6.36b)

$$\int u^{\frac{5}{2}}\,du = \frac{u^{\frac{7}{2}}}{\frac{7}{2}} = \frac{2\cdot\sqrt[2]{u^7}}{7} = \underline{\underline{\frac{2u^3\cdot\sqrt[2]{u}}{7} + C}}$$

c) $$\int t^{\frac{7}{3}}\,dt = \frac{t^{\frac{10}{3}}}{\frac{10}{3}} = \frac{3\cdot\sqrt[3]{t^{10}}}{10} = \underline{\underline{\frac{3t^3\cdot\sqrt[3]{t}}{10} + C}}$$

d) $$\int x^{\frac{2}{5}}\,dx = \frac{x^{\frac{7}{5}}}{\frac{7}{5}} = \frac{5\cdot\sqrt[5]{x^7}}{7} = \underline{\underline{\frac{5x\cdot\sqrt[5]{x^2}}{7}}} + C$$

6.26d) $f(x) = (2x-1)$ $\quad \Delta x = \frac{5-1}{n} = \frac{4}{n}$

$$\int_1^5 f(x)\,dx = \int_1^5 (2x-1)\,dx$$

$$U_n = \frac{4}{n}\cdot\sum_{i=0}^{n-1}\left(1+\frac{8}{n}\cdot i\right) = \frac{4}{n}\cdot\left(\underbrace{\sum_{i=0}^{n-1} 1}_{n} + \frac{8}{n}\underbrace{\sum_{i=0}^{n-1} i}_{\frac{(n-1)\cdot n}{2}}\right) = \frac{4}{n}\cdot\left(n + \frac{8n-8}{2}\right)$$

$$= \frac{4}{n}\cdot\left(n + \frac{2(4n-4)}{2}\right) = (5n+4)\cdot\frac{4}{n} = \frac{20n-16}{n}$$

$$\lim_{n\to\infty}\frac{20n-16}{n}$$

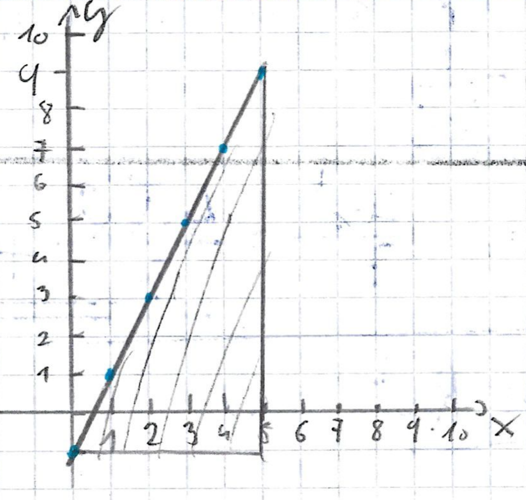
$$U_n = \lim_{n\to\infty}\frac{n\left(20-\frac{16}{n}\right)}{n} = \underline{\underline{20E^2}} \qquad \frac{16}{n}\to 0$$

$$O_n = \frac{4}{n}\cdot\sum_{i=1}^{n}\left(1+\frac{8}{n}\,i\right)$$

$$= \frac{4}{n}\cdot\left(\underbrace{\sum_{i=1}^{n} 1}_{n} + \underbrace{\sum_{i=1}^{n} i}_{\frac{n\cdot(n+1)}{2}}\cdot\frac{8}{n}\right) = \frac{4}{n}\left(n + \frac{8(4n-4)}{8}\right) = \frac{20n+16}{n}$$

$$O_n = \lim_{n\to\infty}\frac{n\cdot\left(20+\frac{16}{n}\right)}{n} = \underline{\underline{20E^2}} \qquad \frac{16}{n}\to 0$$

$$\int_1^5 (2x-1)\,dx = \lim_{n\to\infty} U_n = \lim_{n\to\infty} O_n = 20E^2$$



x	y
0	-1
1	1
2	3
3	5
4	7
5	9