S. 31/3

a) $$\int_{-2}^{1,2}(3x^2-x+2)\,dx = \left[x^3-\frac{1}{2}x^2+2x\right]_{-2}^{1}$$
$$= 1,2^3-\frac{1}{2}\cdot 1,2^2+2\cdot 1,2-\left((-2)^3-\frac{1}{2}\cdot(-2)^2+2\cdot(-2)\right)=3,408-(-14)=\underline{\underline{17,408}}$$

b) $$\int_1^5 3\left(\frac{5}{z}+2z\right)dx = 3\cdot\int_1^5\left(5\cdot\frac{1}{z}+2z\right)dz = 3\cdot\left[5\ln|z|+z^2\right]_1^5$$
$$= 3\cdot\left(5\ln 5+5^2-(\underbrace{5\ln 1}_{=0}+1^2)\right) = 3\cdot(5\ln 5+24)\approx\underline{\underline{96,14}}$$

c) $$\int_{-4}^{4}\frac{1}{2}x(2+t)^2\,dx = \frac{1}{2}(2+t)^2\cdot\int_{-4}^{4}x\,dx = \frac{1}{2}(2+t)^2\cdot\left[\frac{1}{2}x^2\right]_{-4}^{4}$$
$$= \frac{1}{2}(2+t)^2\cdot\left(\frac{1}{2}\cdot 4^2-\frac{1}{2}\cdot(-4)^2\right) = \underline{\underline{0}}$$

d) $$\int_2^4\sqrt{2x+4}\,dx = \int_2^4(2x+4)^{\frac{1}{2}}dx = \left[\frac{1}{2}\cdot\frac{2}{3}(2x+4)^{\frac{3}{2}}\right]_2^4$$
$$= \frac{1}{3}\cdot 12^{\frac{3}{2}}-\frac{1}{3}8^{\frac{3}{2}}\approx\underline{\underline{6,31}}$$

e) $$\int_{4,5}^{3}\left(\frac{2}{t^2}+\frac{2}{t}\right)dt = 2\cdot\int_{4,5}^{3}\left(t^{-2}+\frac{1}{t}\right)dt = 2\cdot\left[-t^{-1}+\ln|t|\right]_{4,5}^{3}$$
$$= 2\cdot\left(-\frac{1}{3}+\ln 3-\left(-\frac{1}{4,5}+\ln 4,5\right)\right) = 2\cdot\left(-\frac{1}{9}+\ln 3-\ln 4,5\right)\approx\underline{\underline{-1,033}}$$

f) $$\int_{-3}^{-1}(-x^3+2e^x)\,dx = \left[-\frac{1}{4}x^4+2e^x\right]_{-3}^{-1} = -\frac{1}{4}+\frac{2}{e}-\left(-\frac{81}{4}+\frac{2}{e^3}\right)\approx\underline{\underline{20,64}}$$

g) $$\int_4^1\frac{2+2z}{z^2+2z+1}\,dz = \int_4^1\frac{2(1+z)}{(z+1)^2}\,dx = \int_4^1\frac{2}{z+1}\,dz = 2\cdot\left[\ln|z+1|\right]_4^1$$
$$= 2(\ln 2-\ln 5)\approx\underline{\underline{-1,83}}$$

h) $$\int_{-1}^{0,5}6e^{4x-1}\cdot e^{2x}\,dx = \int_{-1}^{0,5}6\cdot e^{6x-1}\,dx = \left[e^{6x-1}\right]_{-1}^{0,5} = e^2-e^{-7}\approx\underline{\underline{7,388}}$$

i) $$\int_1^3(4u-2\ln u)\,du = 2\cdot\int_1^3(2u-\ln u)\,du = 2\cdot\left[u^2-(u\ln u-u)\right]_1^3$$
$$= 2\cdot\left[u^2-u\ln u+u\right]_1^3 = 2\left(9-3\ln 3+3-(1-\underbrace{1\ln 1}_{=0}+1)\right) =$$
$$= 2\cdot(10-3\ln 3) = 20-6\ln 3\approx\underline{\underline{13,408}}$$

k) $$\int_1^{\pi}\left(\frac{1}{x}+2\sin x\right)dx = \left[\ln|x|-2\cos x\right]_1^{\pi} = \ln\pi-2\underbrace{\cos\pi}_{-1}-(\underbrace{\ln 1}_{0}-2\cos 1)$$
$$= \ln\pi+2+2\cos 1\approx\underline{\underline{4,225}}\quad\text{(TR auf RAD!)}$$

l) $$\int_1^4\frac{5t}{t^2+1}\,dt-\int_1^4\frac{3t}{t^2+1}\,dt = \int_1^4\frac{2t}{t^2+1}\,dt = \left[\ln|t^2+1|\right]_1^4 = \ln 17-\ln 2\approx\underline{\underline{2,140}}$$

m) $$\int_0^{-2}\frac{2}{(1-x)^2}\,dx = 2\cdot\int_0^{-2}(1-x)^{-2}\,dx = 2\cdot\left[\underbrace{-1\cdot(-1)}_{+}\cdot(1-x)^{-1}\right]_0^{-2} = 2\left(\frac{1}{3}-1\right) = \underline{\underline{-1\frac{1}{3}}}$$

S. 32/6

a) $\int e^{2-2t}\,dt = -\frac{1}{2}\cdot e^{2-2t} + c; \quad c \in \mathbb{R}$

b) $\int 4\cos(4x)\,dx = \sin(4x) + c; \quad c \in \mathbb{R}$

c) $\int_{-a}^{a} x^2\,dx = 10$

$\left[\frac{1}{3}x^3\right]_{-a}^{a} = \frac{1}{3}a^3 - \frac{1}{3}(-a)^3 = \frac{2}{3}a^3 \overset{!}{=} 10 \quad |\cdot\frac{3}{2}$

$a^3 = 15$

$a = \sqrt[3]{15} \approx 2{,}466$

d) $\int \frac{(t-1)(t+1)}{2t^3-2t}\,dt = \int \frac{(t-1)(t+1)}{2t(t-1)(t+1)}\,dt = \int \frac{1}{2t}\,dt = \frac{1}{2}\ln|t| + c; \quad c \in \mathbb{R}$

e) $\int 6\sin(3t+3)\,dt = 2\cdot\int 3\sin(3t+3)\,dt = 2\cdot(-\cos(3t+3)) + c$

$= -2\cos(3t+3) + c; \quad c \in \mathbb{R}$

f) $\int_{1}^{a} \left(\frac{1}{4}x^3 - 8x\right)dx = -4$

$\left[\frac{1}{16}x^4 - 4x^2\right]_1^a = \frac{1}{16}a^4 - 4a^2 - \left(\frac{1}{16} - 4\right) = \frac{1}{16}a^4 - 4a^2 + \frac{63}{16}$

$\frac{1}{16}a^4 - 4a^2 + \frac{63}{16} = -4 \quad |+4$

$\frac{1}{16}a^4 - 4a^2 + \frac{127}{16} = 0 \quad |\cdot 16$

$a^4 - 64a^2 + 127 = 0$ Substitution: $z := a^2$

$z_{1/2} = \frac{64 \pm \sqrt{(64)^2 - 4\cdot 1\cdot 127}}{2} = 32 \pm \sqrt{897}$

$a_{1/2} = \pm 7{,}87; \quad a_{3/4} = \pm 1{,}432$

g) $\int_{-2}^{a} \left(-\frac{2}{u^2} + 2u\right)du = -3$

$\left[\frac{2}{u} + u^2\right]_{-2}^{a} = \frac{2}{a} + a^2 - \left(\frac{2}{-2} + 4\right) = \frac{2}{a} + a^2 - 3 \overset{!}{=} -3$

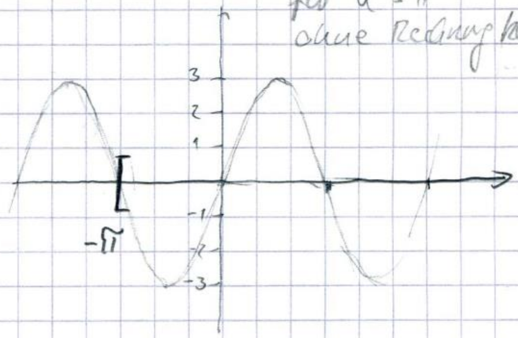
$\frac{2}{a} + a^2 = 0 \quad |\cdot a$

$2 + a^3 = 0$

$\Rightarrow a = \sqrt[3]{-2} \approx -1{,}26$

S.32/6

für $a = \pi$
ohne Rechnung klar!



a) $\int_{-\pi}^{a} 3\sin x \, dx = 0$

$\cos(-\pi) = \cos\pi$

$[-3\cos x]_{-\pi}^{a} = -$

$= -3\cos a - (-3\cos(-\pi))$

$= -3\cos a - (-3\cos\pi)$

$= -3\cos a + 3\cos\pi = \underbrace{-3}_{\neq 0}(\cos a - \cos\pi) \overset{!}{=} 0$

$\cos a = \cos\pi$

$\Rightarrow a = \pi$ bzw $a = (2k+1)\pi$
$k \in \mathbb{Z}$