

7.4

$$\textcircled{1} \int_{-2}^4 -3 dp = -3p \Big|_{-2}^4 = -12 - 6 = \textcircled{-18}$$

$$\textcircled{2} \int_{-4}^1 \sqrt{x} dx = \sqrt{x} \cdot \frac{x}{-1} \Big|_{-4}^1 = \sqrt{x} + 4\sqrt{x} = \textcircled{5\sqrt{2}}$$

$$\textcircled{3} \int_{-1}^2 (5t-3) dt = \frac{5t^2}{2} - 3t \Big|_{-1}^2 = (10-6) - \left(\frac{5}{2}+3\right) = 4 - 5.5 = \textcircled{-1.5}$$

$$\textcircled{4} \int_{-2}^2 (4z+3) dz = 2z^2 + 3z \Big|_{-2}^2 = (8+6) - (8-6) = 14 - 2 = \textcircled{12}$$

$$\textcircled{5} \frac{5x^3}{3} - 2x^2 + 2x \Big|_0^2 = \left(\frac{40}{3} - 8 + 4\right) - 0 = \frac{40}{3} - 4 = \textcircled{\frac{28}{3}}$$

$$\textcircled{6} \frac{-y^3}{3} - \frac{3}{2}y^2 + 5y \Big|_{-2}^3 = \left(-9 - \frac{27}{2} + 15\right) - \left(\frac{8}{3} - 6 - 10\right)$$

$$\left(\frac{-18}{2} - \frac{27}{2} + \frac{30}{2}\right) - \left(\frac{8}{3} - \frac{18}{3} - \frac{30}{3}\right)$$

$$\frac{-15}{2} + \frac{40}{3} = \frac{-45}{6} + \frac{80}{6} = \textcircled{\frac{35}{6}}$$

$$\textcircled{7} x = 4u+1 \quad \int_{\frac{3}{4}}^3 \frac{1}{4} x^{\frac{1}{2}} dx = \frac{3 \cdot 2}{4 \cdot \frac{3}{2}} x^{\frac{3}{2}} \Big|_{\frac{3}{4}}^3 = \frac{1}{2} x^{\frac{3}{2}} = \frac{1}{2} (4u+1) \Big|_0^{\frac{3}{2}}$$

$$dx = 4 du$$

$$\frac{3}{4} dx = 3 du$$

$$= \frac{1}{2} 9^{\frac{3}{2}} - \frac{1}{2} 1^{\frac{3}{2}}$$

$$\frac{27}{2} - \frac{1}{2} = \textcircled{13}$$

$$\textcircled{8} u = 2r-2 \quad \int_3^9 \frac{1}{2} u^{\frac{1}{2}} du = \frac{1}{2} \cdot \frac{2}{3} u^{\frac{3}{2}} = \frac{1}{3} u^{\frac{3}{2}} \Big|_4^{16} = \frac{1}{3} 16^{\frac{3}{2}} - \frac{1}{3} 4^{\frac{3}{2}}$$

$$du = 2 dr$$

$$= \frac{64}{3} - \frac{8}{3} = \textcircled{\frac{56}{3}}$$

$$\textcircled{9} \quad 2 \left( \frac{2}{3} t^{3/2} - \frac{1}{2} t^2 \right) \Big|_0^4 = 2 \left[ \left( \frac{16}{3} - 8 \right) - 0 \right]$$

$$= \frac{-16}{3}$$

$$\textcircled{10} \quad 3 \frac{2}{3} x^{3/2} + \frac{2}{3} x^{3/2} \Big|_0^4 = \frac{16}{3} x^{3/2} - \frac{16}{3} x^{3/2} \Big|_0^4$$

$$= \frac{16 \cdot 32}{3} - \frac{16}{3} = \frac{496}{3}$$

$$\frac{-656}{15}$$

$$\textcircled{11} \quad \int_1^4 (5y^{3/2} + 3y^{5/2}) dy = 5 \frac{2}{5} y^{5/2} + 3 \frac{2}{3} y^{7/2} \Big|_1^4 = 2y^{5/2} + 2y^{7/2}$$

$$= (64 + 16) - (2 + 2) = \textcircled{76}$$

$$\textcircled{12} \quad \int_4^9 (4r^{1/2} - 3r^{3/2}) dr = 4 \frac{2}{3} r^{3/2} - 3 \frac{2}{3} r^{5/2} \Big|_4^9 = \frac{8}{3} r^{3/2} - \frac{6}{5} r^{5/2} \Big|_4^9$$

$$= \left( \frac{8}{3} (27) - \frac{6}{5} (243) \right) - \left( \frac{8}{3} (8) - \frac{6}{5} (32) \right)$$

$$\frac{316}{3} - \frac{1458}{5} - \frac{64}{3} + \frac{192}{5}$$

$$\frac{152}{3} - \frac{1266}{5} = \frac{760}{15} - \frac{3798}{15} = \frac{-3038}{15}$$

$$\begin{array}{r} 240 \\ 6 \\ \hline 1458 \end{array}$$

$$\begin{array}{r} 16016 \\ 3 \\ \hline 1488 \\ 192 \\ \hline 1266 \end{array}$$

$$\begin{array}{r} 216 \\ 84 \\ \hline 130 \end{array}$$

$$\textcircled{13} \quad \begin{aligned} U &= 2x-7 \\ du &= 2 dx \end{aligned} \quad \int u^{-2} du = -u^{-1} = \frac{-1}{2x-7} \Big|_4^6$$

$$= \frac{-1}{5} - \frac{-1}{-1} = \frac{4}{5}$$

$$\textcircled{15} \quad \frac{-6}{n} + \frac{1}{2n^2} \Big|_1^5 = \left( \frac{-6}{5} + \frac{1}{50} \right) - \left( -6 + \frac{1}{2} \right)$$

$$= \frac{-59}{50} + \frac{300}{50} - \frac{25}{50} = \frac{216}{50} = \frac{108}{25}$$

$$\textcircled{17} \quad -20e^{-1/y} + 3\ln y \Big|_{-3}^{-2} = (-20e^{-2} + 3\ln 2) - (-20e^{-3} + 3\ln 3)$$

$$-20e^{-2} + 3\ln 2 + 20e^{-3} - 3\ln 3$$

$$\textcircled{19} \quad \int_1^2 (e^{4u} - (u+1)^{-2}) du = \frac{1}{4} e^{4u} \Big|_1^2 + \frac{1}{u+1} \Big|_1^2$$

$$\int x^{-2} dx$$

$$x = u+1$$

$$-x^{-1}$$

$$\frac{e^8}{4} - \frac{e^4}{4} + \left( \frac{1}{3} - \frac{1}{2} \right)$$

$$dx = du$$

$$\frac{e^8}{4} - \frac{e^4}{4} - \frac{1}{6}$$

$$\frac{2}{6} - \frac{3}{6}$$

$$\textcircled{21} \quad \begin{aligned} U &= 2y^2-3 \\ du &= 4y dy \end{aligned} \quad \int \frac{1}{4} u^5 du = \frac{1}{24} u^6 = \frac{(2y^2-3)^6}{24} \Big|_0^1$$

$$\frac{1}{4} du = y dy$$

$$= \frac{(-3)^6}{24} - \frac{(-1)^6}{24} = \frac{729}{24} - \frac{1}{24} = \frac{728}{24} = \frac{91}{3}$$

$$\frac{1}{2} - \frac{1}{3} = \frac{3}{6} - \frac{2}{6}$$

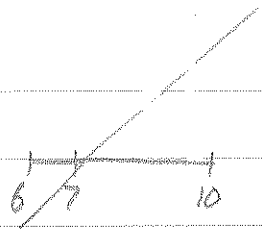
$$\begin{aligned} (23) \int_1^{64} (z^{1/6} - 2z^{-1/3}) dz &= \left. \frac{6}{7} z^{7/6} - 2 \cdot \frac{3}{2} z^{2/3} \right|_1^{64} \\ &= \left[ \frac{6}{7} (128) - 3(64)^{2/3} \right] - \left[ \frac{6}{7} - 3 \right] \\ &= \left( \frac{768}{7} - 48 \right) - \left[ \frac{-15}{7} \right] \\ &= \frac{768}{7} - \frac{336}{7} + \frac{15}{7} = \frac{447}{7} \end{aligned}$$

$$\begin{aligned} (25) \int_1^2 \left(\frac{1}{x}\right) (\ln x) dx & \quad u = \ln x \\ & \quad du = \frac{1}{x} dx \\ \int u du & \\ \frac{u^2}{2} &= \frac{(\ln x)^2}{2} \Big|_1^2 = \frac{(\ln 2)^2}{2} - 0 = \frac{(\ln 2)^2}{2} \end{aligned}$$

$$\begin{aligned} (27) \quad u = x^{1/3} + 9 & \quad \int \frac{3}{4} u^{1/2} du = \frac{3}{4} \cdot \frac{2}{3} u^{3/2} = \frac{1}{2} u^{3/2} \\ du = \frac{1}{3} x^{-2/3} dx & \\ \frac{3}{4} du = x^{-2/3} dx & = \frac{1}{2} (x^{1/3} + 9)^{3/2} \Big|_0^8 \\ &= \frac{1}{2} (125) - \frac{1}{2} (27) = \frac{98}{2} = 49 \end{aligned}$$

$$\begin{aligned} (29) \quad u = 3 + e^{2t} & \quad \int \frac{1}{2} u^{-2} du = -\frac{1}{2} u^{-1} = \frac{-1}{2(3 + e^{2t})} \Big|_0^1 \\ du = 2e^{2t} dt & \\ \frac{1}{2} du = e^{2t} dt & = \frac{-1}{6 + 2e^2} - \frac{-1}{8} \\ &= \frac{-1}{6 + 2e^2} + \frac{1}{8} \end{aligned}$$

③①  $f(x) = 2x - 14 = 0$   
 $x = 7$



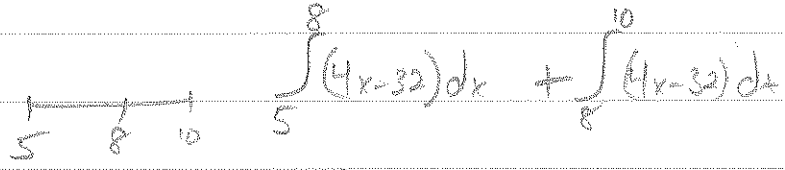
$$\int_6^7 (2x-14) dx + \int_7^{10} (2x-14) dx$$

$$x^2 - 14x \Big|_6^7 + x^2 - 14x \Big|_7^{10}$$

$$-49 - (-48) + 100 - 140 + 49$$

$$|-1| + 9 = 10$$

③②  $4x - 32 = 0$   
 $x = 8$



$$2x^2 - 32x \Big|_5^8 + 2x^2 - 32x \Big|_8^{10}$$

$$-128 + 110 + (-20 + 128)$$

$$|-18| + 8 = 26$$

33)  $2 - 2x^2 = 0$

$2 = 2x^2$

$1 = x^2$

$\pm 1 = x$



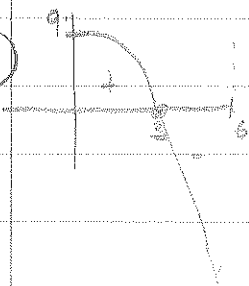
$$\int_0^1 (2 - 2x^2) dx + \left| \int_{-1}^0 (2 - 2x^2) dx \right| = 2x - \frac{2}{3}x^3 \Big|_0^1 + 2x - \frac{2}{3}x^3 \Big|_{-1}^0$$

$$\left( 2 - \frac{2}{3} \right) - 0 + \left| \left( 0 - \frac{2 \cdot 0}{3} \right) - \left( 2 \cdot \frac{2}{3} \right) \right|$$

$$\frac{4}{3} + \left| -\frac{4}{3} - \frac{4}{3} \right|$$

$$\frac{4}{3} + \frac{8}{3} = \frac{12}{3} = 4$$

34)



$$\int_0^3 (9 - x^2) dx + \left| \int_{-3}^0 (9 - x^2) dx \right|$$

$$9x - \frac{1}{3}x^3 \Big|_0^3 + \left| 9x - \frac{1}{3}x^3 \Big|_{-3}^0 \right|$$

$$(27 - 9) + \left| (54 - 72) - 18 \right|$$

$$18 + 36 = 54$$

35)

$$\left| \int_{-1}^0 x^3 dx \right| + \int_0^3 x^3 dx$$

$$\left| \frac{1}{4}x^4 \Big|_{-1}^0 \right| + \frac{1}{4}x^4 \Big|_0^3$$

$$\left| 0 - \frac{1}{4} \right| + \frac{81}{4} - 0$$

$$\frac{1}{4} + \frac{81}{4} = \frac{82}{4} = \frac{41}{2}$$

$$(36) x^3 - 2x = 0$$

$$x(x^2 - 2) = 0$$

$$x = 0 \quad x = \pm\sqrt{2}$$

$$\int_{-2}^{-\sqrt{2}} (x^3 - 2x) dx + \int_{-\sqrt{2}}^0 (x^3 - 2x) dx + \int_0^{\sqrt{2}} (x^3 - 2x) dx + \int_{\sqrt{2}}^4 (x^3 - 2x) dx$$

$$\left| \frac{1}{4}x^4 - x^2 \right|_{-2}^{-\sqrt{2}} + \left| \frac{1}{4}x^4 - x^2 \right|_{-\sqrt{2}}^0 + \left| \frac{1}{4}x^4 - x^2 \right|_0^{\sqrt{2}} + \left| \frac{1}{4}x^4 - x^2 \right|_{\sqrt{2}}^4$$

$$\left| \frac{1}{4}(1-2) - (4-4) \right| + 0 + 1 + \left| \frac{1}{4}(1-2) - 0 \right| + 64 - 16 + 1$$

$$1 + 1 + 1 + 49$$

$$(37) e^x = 1$$

$$x = \ln 1 = 0$$

$$\left| \int_{-1}^0 (e^x - 1) dx \right| + \int_0^2 (e^x - 1) dx$$

$$\left| e^x - x \right|_{-1}^0 + e^x - x \Big|_0^2$$

$$\left| (1-0) - \left(\frac{1}{e} + 1\right) \right| + (e^2 - 2) - 1$$

$$\frac{1}{e} + e^2 - 3$$

$$(38) 1 - e^{-x} = 0$$

$$1 = \frac{1}{e^x}$$

$$e^x = 1$$

$$x = 0$$

$$\int_{-1}^0 (1 - e^{-x}) dx + \int_0^2 (1 - e^{-x}) dx$$

$$x + e^{-x} \Big|_{-1}^0 + x + e^{-x} \Big|_0^2$$

$$(0+1) - (-1+e) + (2+\frac{1}{e^2}) - (0+1)$$

$$|2 - e| + 1 + \frac{1}{e^2} \approx 1.853$$

$$\ln e^{-1}$$

$$-(\ln e)$$

□

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$$1 - \frac{1}{x} = 0$$

$$1 = x$$

$$\int_{e^{-1}}^1 \left(1 - \frac{1}{x}\right) dx + \int_1^e \left(1 - \frac{1}{x}\right) dx$$

$$x - \ln|x| \Big|_{e^{-1}}^1 + x - \ln|x| \Big|_1^e$$

$$(1-0) - \left(\frac{1}{e} + 1\right) + (e-1) - (1-0)$$

$$\frac{1}{e} + e - 2$$

$$\frac{1}{e} + e - 2$$