10.5

1) $\int \dfrac{1}{x^2}\,dx = \int x^{-2}\,dx = \frac{1}{-2+1}\,x^{-2+1} = \frac{1}{-1}\,x^{-1} = -\dfrac{1}{x} + c$

2) $\int \dfrac{2}{x^3}\,dx = \int 2\,x^{-3}\,dx = 2\cdot\frac{1}{-3+1}\,x^{-3+1} = 2\cdot\frac{1}{-2}\,x^{-2} = -\dfrac{1}{x^2} + c$

3) $\int -\dfrac{7}{x^5}\,dx = \int -7\,x^{-5}\,dx = -7\cdot\frac{1}{-5+1}\,x^{-5+1} = -7\cdot\frac{1}{-4}\,x^{-4}$

$\qquad\qquad = \dfrac{7}{4}\cdot\dfrac{1}{x^4} = \dfrac{7}{4\,x^4} + c$

4) $\int \left(1+\dfrac{1}{x^2}\right) dx = \int (1+x^{-2})\,dx = x + \frac{1}{-2+1}\,x^{-2+1} = x + \frac{1}{-1}\,x^{-1} = x - \dfrac{1}{x} + c$

5) $\int \left(4+\dfrac{2}{x^2}-\dfrac{5}{x^4}\right) dx = \int (4 + 2\,x^{-2} - 5\,x^{-4})\,dx$

$\qquad\qquad = 4\,x + 2\cdot\dfrac{1}{-2+1}\,x^{-2+1} - 5\cdot\dfrac{1}{-4+1}\,x^{-4+1}$

$\qquad\qquad = 4\,x + 2\cdot\dfrac{1}{-1}\,x^{-1} - 5\cdot\dfrac{1}{-3}\,x^{-3} = 4\,x - \dfrac{2}{x} + \dfrac{5}{3\,x^3} + c$

6) $\int \left(-\dfrac{4}{x^4}-\dfrac{1}{x^3}+\dfrac{3}{x^5}\right) dx = \int (-4\,x^{-4} - x^{-3} + 3\,x^{-5})\,dx$

$\qquad\qquad = -4\frac{1}{-4+1}\,x^{-4+1} - \frac{1}{-3+1}\,x^{-3+1} + 3\cdot\frac{1}{-5+1}\,x^{-5+1}$

$\qquad\qquad = \tfrac{4}{3}\,x^{-3} + \tfrac{1}{2}\,x^{-2} - \tfrac{3}{4}\,x^{-4} = \dfrac{4}{3\,x^3} + \dfrac{1}{2\,x^2} - \dfrac{3}{4\,x^4} + c$

7) $\int \sqrt{x}\,dx = \int x^{\frac{1}{2}}\,dx = \dfrac{1}{\frac{1}{2}+1}\,x^{\frac{1}{2}+1} = \dfrac{1}{\frac{3}{2}}\,x^{\frac{3}{2}} = \tfrac{2}{3}\sqrt{x^3} = \tfrac{2}{3}\,x\,\sqrt{x} + c$

8) $\int \sqrt[3]{x}\,dx = \int x^{\frac{1}{3}}\,dx = \dfrac{1}{\frac{1}{3}+1}\,x^{\frac{1}{3}+1} = \dfrac{1}{\frac{4}{3}}\,x^{\frac{4}{3}} = \tfrac{3}{4}\sqrt[3]{x^4} = \tfrac{3}{4}\,x\,\sqrt[3]{x} + c$

9) $\int \dfrac{1}{\sqrt{x}}\,dx = \int x^{-\frac{1}{2}}\,dx = \dfrac{1}{-\frac{1}{2}+1}\,x^{-\frac{1}{2}+1} = \dfrac{1}{\frac{1}{2}}\,x^{\frac{1}{2}} = 2\sqrt{x} + c$

10) $\int \dfrac{1}{\sqrt[3]{x^2}}\,dx = \int x^{-\frac{2}{3}}\,dx = \dfrac{1}{-\frac{2}{3}+1}\,x^{-\frac{2}{3}+1} = \dfrac{1}{\frac{1}{3}}\,x^{\frac{1}{3}} = 3\sqrt[3]{x} + c$

11) $\int x\,\sqrt{x}\,dx = \int \sqrt{x^3}\,dx = \int x^{\frac{3}{2}}\,dx = \dfrac{1}{\frac{3}{2}+1}\,x^{\frac{3}{2}+1} = \dfrac{1}{\frac{5}{2}}\,x^{\frac{5}{2}} = \tfrac{2}{5}\sqrt{x^5}$

$\qquad\qquad = \tfrac{2}{5}\,x^2\,\sqrt{x} + c$

12) $\int \left(\sqrt{x}-\dfrac{1}{\sqrt{x}}\right) dx = \int (x^{\frac{1}{2}} - x^{-\frac{1}{2}})\,dx = \dfrac{1}{\frac{1}{2}+1}\,x^{\frac{1}{2}+1} - \dfrac{1}{-\frac{1}{2}+1}\,x^{-\frac{1}{2}+1}$

$\qquad\qquad = \dfrac{1}{\frac{3}{2}}\,x^{\frac{3}{2}} - \dfrac{1}{\frac{1}{2}}\,x^{\frac{1}{2}} = \tfrac{2}{3}\sqrt{x^3} - 2\sqrt{x} = \tfrac{2}{3}\,x\,\sqrt{x} - 2\sqrt{x} + c$

13) $\displaystyle\int\left(\sqrt[3]{x}+\frac{1}{\sqrt[3]{x}}\right)dx = \int(x^{\frac{1}{3}}+x^{-\frac{1}{3}})\,dx = \frac{1}{\frac{1}{3}+1}\,x^{\frac{1}{3}+1}+\frac{1}{-\frac{1}{3}+1}\,x^{-\frac{1}{3}+1} =$

$\displaystyle\frac{1}{\frac{4}{3}}\,x^{\frac{4}{3}}+\frac{1}{\frac{2}{3}}\,x^{\frac{2}{3}} = \frac{3}{4}\,\sqrt[3]{x^4}+\frac{3}{2}\,\sqrt[3]{x^2} = \frac{3}{4}\,x\,\sqrt[3]{x}+\frac{3}{2}\,\sqrt[3]{x^2}+c$

14) $\displaystyle\int\left(-\frac{2}{\sqrt[3]{x}}+\frac{1}{\sqrt[3]{x^4}}\right)dx = \int(-2\,x^{-\frac{1}{3}}+x^{-\frac{4}{3}})\,dx$

$\displaystyle\qquad\qquad = -2\cdot\frac{1}{-\frac{1}{3}+1}\,x^{-\frac{1}{3}+1}+\frac{1}{-\frac{4}{3}+1}\,x^{-\frac{4}{3}+1}$

$\displaystyle\qquad\qquad = -2\cdot\frac{1}{\frac{2}{3}}\,x^{\frac{2}{3}}+\frac{1}{-\frac{1}{3}}\,x^{-\frac{1}{3}} = -3\,\sqrt[3]{x^2}-\frac{3}{\sqrt[3]{x}}+c$