1. $\int \frac{4x^2+7x-5}{x}\,dx = \int\left(4x+7-\frac{5}{x}\right)dx = \int 4x\,dx + \int 7\,dx - \int \frac{5}{x}\,dx = 4\int x\,dx + 7\int 1\,dx - 5\int \frac{1}{x}\,dx = 4\,\frac{x^2}{2} + 7\cdot x - 5\ln|x| + C =$

$= 2x^2 + 7x - 5\ln|x| + C$

2. $\int \frac{3^x - 3^{2x} + 5^{x+2}}{4^x}\,dx = \int\left(\frac{3^x}{4^x} - \frac{3^{2x}}{4^x} + \frac{5^{x+2}}{4^x}\right)dx = \int\left(\frac{3}{4}\right)^x dx - \int\left(\frac{9}{4}\right)^x dx + 25\int\left(\frac{5}{4}\right)^x dx = \left(\frac{3}{4}\right)^x \ln\frac{3}{4} - \left(\frac{9}{4}\right)^x \ln\frac{9}{4} + 25\left(\frac{5}{4}\right)^x \ln\frac{5}{4} + C$

7. $\int 22\cdot(2x+3)^{10}\,dx = 22\int (2x+3)^{10}dx = \left|\begin{array}{l} t = 2x+3 \\ dt = (2x+3)'dx \\ dt = 2dx \\ dx = \frac{dt}{2} \end{array}\right| = 22\int t^{10}\frac{dt}{2} = \frac{22}{2}\int t^{10}dt = 11\cdot\frac{t^{11}}{11} + C \overset{t=2x+3}{=} (2x+3)^{11} + C$

9. $\int \sqrt{3-2x}\,dx = \left|\begin{array}{l} t = 3-2x \\ dt = (3-2x)'dx \\ dt = -2dx \\ dx = -\frac{dt}{2} \end{array}\right| = \int \sqrt{t}\left(-\frac{dt}{2}\right) = -\frac{1}{2}\int t^{\frac{1}{2}}dt = -\frac{1}{2}\cdot\frac{t^{\frac{3}{2}}}{\frac{3}{2}} + C = -\frac{1}{2}\cdot\frac{2}{3}t\sqrt{t} + C = -\frac{1}{3}t\sqrt{t} + C =$

$\overset{t=3-2x}{=} -\frac{1}{3}(3-2x)\sqrt{3-2x} + C$

12. $\int \frac{1}{\sin^2\frac{2x+\pi}{3}}\,dx = \left|\begin{array}{l} t = \frac{2x+\pi}{3} \\ dt = \left(\frac{2x+\pi}{3}\right)'dx \\ dt = \frac{2}{3}dx \\ dx = \frac{3}{2}dt \end{array}\right| = \int \frac{1}{\sin^2 t}\cdot\frac{3}{2}\,dt = \frac{3}{2}\int\frac{dt}{\sin^2 t} = \frac{3}{2}(-\operatorname{ctg} t) + C \overset{t=\frac{2x+\pi}{3}}{=} -\frac{3}{2}\operatorname{ctg}\left(\frac{2x+\pi}{3}\right) + C$