15.3: 6, 16, 21, 23, 24 (First half).

6.) $\int \frac{3x^2}{(2+5x)^2}\,dx$ → p 817 # 8.

$u = x \quad a = 2$

$du = dx \quad b = 5.$

$= 3\int \frac{x^2}{(2+5x)^2}\,dx$

$= 3\int \frac{u^2}{(a+bu)^2}\,du = 3\left(\frac{x}{5^2} - \frac{2^2}{5^3(2+5x)} - \frac{2\cdot 2}{5^3}\ln|2+5x|\right) + C$

16.) $\int \frac{2x^2}{3+7x}\,dx$ → p 817 # 4

$u = x \quad a = 3$

$du = dx \quad b = 7$

$= 2\int \frac{x^2}{3+7x}\,dx$

$= 2\int \frac{u^2}{a+bu}\,du = 2\left(\frac{x^2}{2\cdot 7} - \frac{3x}{7^2} + \frac{3^2}{7^3}\ln|3+7x|\right) + C$

21.) $\int x^2 e^x\,dx$ → p819 #39

$u = x \quad n = 2$

$du = dx \quad a = 1$

$= \int u^n e^{au}\,du = \frac{x^2}{1^2} - \frac{2}{1}\int x^1 e^x\,dx$

$= x^2 - 2\int x e^x\,dx$ → p 818 # 38

$u = x \quad a = 1$

$du = dx$

$= x^2 - 2\int u e^{au}\,du$

$= x^2 - 2\left(\frac{e^x}{1^2}(1\cdot x - 1)\right) + C$

So here we had to do tables TWICE!

23.)

$$\int \frac{\sqrt{5x^2+1}}{2x^2}\,dx \longrightarrow$$

p 818 #26

$u^2 = 5x^2 \rightarrow x^2 = \frac{u^2}{5}$

$u = \sqrt{5}x$

$du = \sqrt{5}\,dx \qquad a^2 = 1$

$dx = \frac{du}{\sqrt{5}} \qquad a = 1$

$$= \frac{1}{2}\int \frac{\sqrt{u^2+a^2}}{\frac{u^2}{5}}\,\frac{du}{\sqrt{5}}$$

$$= \frac{5}{2\sqrt{5}}\int \frac{\sqrt{u^2+a^2}}{u^2}\,du$$

Formula #24

$$= \frac{5}{2\sqrt{5}}\left(-\frac{\sqrt{5x^2+1}}{\sqrt{5}\,x} + \ln\left|\sqrt{5}\,x + \sqrt{5x^2+1}\right|\right) + C.$$

24.) $\int \frac{dx}{x\sqrt{2-x}} \longrightarrow$

p 818 # 17.

$u = x \qquad a = 2$

$du = dx \qquad b = -1$

$(a > 0$ ✓$)$

$$= \int \frac{du}{u\sqrt{a+bu}}$$

Formula #17

$$= \frac{1}{\sqrt{2}}\ln\left|\frac{\sqrt{2-x}-\sqrt{2}}{\sqrt{2-x}+\sqrt{2}}\right| + C.$$