انتگرال[۱]
بخش ۱

[۱] Sh. Nosrati, 13961208 update 14000125 ES0.

$$
\begin{aligned}
I_{۱} &= \int (۱+x)^{۵۵}\,\mathrm{dx} \\
&= \int (۱+x)^{۵۵}\,\mathrm{dx} \ ; \quad ۱+x=u \\
&= \int (۱+x)^{۵۵}\,\mathrm{dx} \ ; \quad \mathrm{dx} = \mathrm{du} \\
&= \int u^{۵۵}\ \mathrm{du} \\
&= \frac{u^{۵۶}}{۵۶} + C \\
&= \frac{(۱+x)^{۵۶}}{۵۶} + C
\end{aligned}
$$

$$
\begin{aligned}
I_{۲} &= \int_{۰}^{۱} (۱+x)^{۵۵}\,\mathrm{dx} \\
&= \left.\frac{(۱+x)^{۵۶}}{۵۶}\right|_{۰}^{۱} \\
&= \frac{(۱+۱)^{۵۶}}{۵۶} - \frac{(۱+۰)^{۵۶}}{۵۶} \\
&= \frac{۲^{۵۶}}{۵۶} - \frac{۱}{۵۶} \\
&= \frac{۲^{۵۶}-۱}{۵۶}
\end{aligned}
$$

$$
\begin{aligned}
I_{۳} &= \int_{۰}^{۱}\int_{۰}^{۱}(۱+x)^{۲}(۱+y)^{۳}\,\mathrm{dx}\;\mathrm{dy}\\
&= \int_{۰}^{۱}(۱+x)^{۲}\,\mathrm{dx}\int_{۰}^{۱}(۱+y)^{۳}\,\mathrm{dy}\\
&= \frac{۷}{۳}\cdot\frac{۱۵}{۴}\\
&= \frac{۳۵}{۴}
\end{aligned}
$$

$$
\begin{aligned}
I_{۴} &= \int\int x^{۳}y^{۶}\,\mathrm{dx}\,\mathrm{dy} \\
&= \int x^{۳}\,\mathrm{dx}\int y^{۶}\,\mathrm{dy} \\
&= \left(\frac{x^{۴}}{۴}+C_{۱}\right)\left(\frac{y^{۷}}{۷}+C_{۲}\right) \\
&= \frac{۱}{۲۸}x^{۴}y^{۷}+\frac{C_{۲}}{۴}x^{۴}+\frac{C_{۱}}{۷}y^{۷}+C_{۱}C_{۲}
\end{aligned}
$$

$$
\begin{aligned}
I_{۵} &= \int \frac{\sqrt{x}}{۱-x}\,\mathrm{dx} \\
&= \int \frac{\sqrt{x}}{۱-x}\,\mathrm{dx} \quad ; \quad x = u^{۲} \implies \mathrm{dx} = ۲u\,\mathrm{du} \\
&= \int \frac{۲u^{۲}}{۱-u^{۲}}\,\mathrm{du} \\
&= -۲u + \int \frac{۲}{۱-u^{۲}}\,\mathrm{du} \\
&= -۲u + \ln\frac{۱+u}{۱-u} + C \\
&= -۲\sqrt{x} + \ln\frac{۱+\sqrt{x}}{۱-\sqrt{x}} + C
\end{aligned}
$$