1. Compute the following integrals.

a) $\int \tan^5(x)\sec^6(x)\,dx,$ $\quad = \int \tan^4(x)\sec^5(x)\,\sec(x)\tan(x)\,dx$

$$= \int (\sec^2(x)-1)^2\sec^5(x)\,\sec(x)\tan(x)\,dx \qquad u=\sec(x)$$
$$du = \sec(x)\tan(x)$$
$$= \int (u^2-1)^2 u^5\,du$$
$$= \int (u^4-2u^2+1)u^5\,du$$
$$= \int u^9 - 2u^7 + u^5\,du = \boxed{\tfrac{1}{10}\sec^{10}(x) - \tfrac{2}{8}\sec^8(x) + \tfrac{1}{6}\sec^6(x) + C}$$

b) $\int \csc^2(3-2x)\,dx,$ $\quad = -\tfrac{1}{2}\int \csc^2(u)\,du$

$u = 3-2x$
$du = -2x\,dx$

$$= \tfrac{1}{2}\cot(u) + C$$
$$= \boxed{\tfrac{1}{2}\cot(3-2x) + C}$$

c) $\int \cot^5(x)\csc^5(x)\,dx,$ $\quad = \int \cot^4(x)\csc^4(x)\,\cot(x)\csc(x)\,dx$

$$= \int (\csc^2(x)-1)^2\csc^4(x)\,\cot(x)\csc(x)\,dx \qquad u = \csc(x)$$
$$du = -\csc(x)\cot(x)\,dx$$
$$= \int (u^2-1)^2 u^4\cdot(-1)\,du$$
$$= \int -u^8 + 2u^6 - u^4\,du$$
$$= \boxed{-\tfrac{1}{9}\csc^9(x) + \tfrac{2}{7}\csc^7(x) - \tfrac{1}{5}\csc^5(x) + C}$$

d) $\int \tan^3(t)\,dt.$ $\quad = \int (\sec^2(t)-1)\tan(t)\,dt$

$$= \int \sec^2(t)\tan(t)\,dt - \int \tan(t)\,dt$$
$$= \boxed{\tfrac{1}{2}\tan^2(t) - \ln|\sec(t)| + C}$$

$\uparrow$
u-sub for $\tan(t)$