1 | $\int \ln x dx$

$$\int \ln x dx = \int 1 \ln x dx$$
$$= x \ln x - \int x \frac{1}{x} dx$$
$$= x \ln x - \int 1 dx$$
$$= \boxed{x \ln x - x}$$

2 | $\int \tan^- x dx$

$$\int \tan^- x dx = x \tan^- x - \int x \frac{1}{x^2 + 1} dx$$
$$= x \tan^- x - \frac{1}{2} \int \frac{du}{u}$$
$$= x \tan^- x \frac{1}{2} \ln u + C \qquad = x \tan^- x \frac{1}{2} \ln(x^2 + 1) + C$$

3 | $\int x \sec^2 x dx$

$$\int x \sec^2 x dx = \frac{1}{2} x^2 \sec^2 x$$