$$\frac{d}{dx}\int_{u(x)}^{v(x)} f(t)\,dt = f(v(x))\cdot\frac{dv}{dx} - f(u(x))\cdot\frac{du}{dx}$$

Leibniz's Rule

$$\frac{a}{n+1}x^{n+1} + C$$

~~Parts formula~~

$$\int u\cdot dv = uv - \int v\cdot du$$

$$\int \sin^2 x\,dx = \frac{1}{2}x - \frac{1}{4}\sin 2x + C$$

$$\int \cos^2 x\,dx = \frac{1}{2}x + \frac{1}{4}\sin 2x + C$$

$$\tan^2 x\,dx = \int (\sec^2 x - 1)\,dx$$

$$= \tan x - x + C$$

(33) $\sin^{-1}\left(\frac{x}{a}\right) + C$

(34) $\frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C$

$$\frac{1}{2}\int \frac{2x}{a^2+x^2}\,dx$$

$u \equiv a^2 + x^2$

$du = 2x\,dx$

$$\frac{1}{2}\int \frac{du}{u} = \frac{1}{2}\ln(a^2+x^2)$$

10P

#1. $X \sim N(\mu, 9)$ $\sigma^2$ $\sigma = 3$

$P(X \leq 5) = 0.754$ $\quad z = \frac{x - \mu}{\sigma}$

$z = \text{invnorm}(0.754) = 0.68713 = \frac{5 - \mu}{3}$

$\mu = 2,94$

#2. $X \sim N(\mu, \sigma^2)$

$P(X \leq 11) = 0.345$ $\quad P(X \leq 3) = 0,943$

$z = \text{invnorm}(0.345) = -0,3989 = \frac{1 - \mu}{\sigma}$

$z = \text{invnorm}(0.943) = 1.5805 = \frac{3 - \mu}{\sigma}$

$$\begin{cases} -0.3989\sigma + \mu = 1 \\ 1,5805\sigma + \mu = 3 \end{cases}$$

$-1.979\sigma = -2$

$\sigma = 1.01$ $\quad \mu = 1,40$

#3 $P(X \geq 58.44) = 0.022$

↳ the $1 - 0.022 = 0.978$ percentile

$Z = \text{invnorm}(0.978) =$

#4 $X$ = weight of bag

$X \sim N(1.03, \sigma^2)$

$\boxed{P(X < 1) = 0.018}$

$Z = \text{invnorm}(0.018)$

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HW 10P (#3–5) #6–8