

W10 - P1

$$\text{Integrate}\left[\frac{1}{\sqrt{x^2 + a^2}}, x\right] + C$$

$$C + \text{Log}\left[x + \sqrt{a^2 + x^2}\right]$$

W10 - P2

\$Assumptions = k > 0 && T > 0 && m > 0;

$$p[v_]:=4 \pi \left(\frac{m}{2 \pi k T}\right)^{3/2} v^2 \text{Exp}\left[-\frac{m v^2}{2 k T}\right];$$

Integrate[v p[v], {v, 0, \infty}]

$$2 \sqrt{\frac{2}{\pi}} \sqrt{\frac{k T}{m}}$$

W10 - P3

\$Assumptions = a > 0 && n \in \text{Integers} && n > 0;

$$\text{Integrate}\left[x^{2n} \text{Exp}[-a x^2], \{x, 0, \infty\}\right] - \frac{\prod_{k=1}^n (2k-1)}{2^{n+1} a^n} \sqrt{\frac{\pi}{a}} // \text{Simplify}$$

0

W10 - P4

$$\text{Integrate}\left[\frac{1}{1 + \text{Sin}[\theta] + \text{Cos}[\theta]}, \theta\right] + C$$

$$C - \text{Log}\left[\text{Cos}\left[\frac{\theta}{2}\right]\right] + \text{Log}\left[\text{Cos}\left[\frac{\theta}{2}\right] + \text{Sin}\left[\frac{\theta}{2}\right]\right]$$

W10 - P5

A = Series[f[x + h], {h, 0, 2}]

B = Series[f[x - h], {h, 0, 2}]

$$f[x] + f'[x] h + \frac{1}{2} f''[x] h^2 + O[h]^3$$

$$f[x] - f'[x] h + \frac{1}{2} f''[x] h^2 + O[h]^3$$

$\frac{A - 2 f[x] + B}{h^2}$

h²

f''[x] + O[h]¹

W10 - P6

X is princess, Y is prince; 1 refers to past, 2 to present, and 3 to future age

Eliminate[

$$\{X2 == Y3, X3 == 2 Y1, X1 == \frac{X2 + Y2}{2}, X1 - Y1 == X2 - Y2, X1 - Y1 == X3 - Y3\}, \{X1, Y1, X3, Y3\}]$$

$$4 Y2 == 3 X2$$