Handout 1
Standard Integrals

These standard integrals involving $e^{-\alpha x^2}$ are used when integrating the velocity component and Maxwell speed distributions. You are not expected to remember them. If needed they will be given in the exam.

$$\int_0^\infty e^{-\alpha x^2}\mathrm{d}x = \frac{1}{2}\left(\frac{\pi}{\alpha}\right)^{1/2}$$

$$\int_{-\infty}^\infty e^{-\alpha x^2}\mathrm{d}x = \left(\frac{\pi}{\alpha}\right)^{1/2}$$

$$\int_0^\infty x e^{-\alpha x^2}\mathrm{d}x = \frac{1}{2\alpha}$$

$$\int_{-\infty}^\infty x e^{-\alpha x^2}\mathrm{d}x = 0$$

$$\int_0^\infty x^2 e^{-\alpha x^2}\mathrm{d}x = \frac{1}{4}\left(\frac{\pi}{\alpha^3}\right)^{1/2}$$

$$\int_{-\infty}^\infty x^2 e^{-\alpha x^2}\mathrm{d}x = \frac{1}{2}\left(\frac{\pi}{\alpha^3}\right)^{1/2}$$

$$\int_0^\infty x^3 e^{-\alpha x^2}\mathrm{d}x = \frac{1}{2\alpha^2}$$

$$\int_{-\infty}^\infty x^3 e^{-\alpha x^2}\mathrm{d}x = 0$$

$$\int_0^\infty x^4 e^{-\alpha x^2}\mathrm{d}x = \frac{3}{8}\left(\frac{\pi}{\alpha^5}\right)^{1/2}$$

$$\int_{-\infty}^\infty x^4 e^{-\alpha x^2}\mathrm{d}x = \frac{3}{4}\left(\frac{\pi}{\alpha^5}\right)^{1/2}$$