Problem 1.

For each of the assumptions listed on slide 1-9, give a physical situation for which the assumption may not be a good one.

- Particles are points
- Particles travel in straight lines, unaccelerated until they interact
- Particles don't hit other particles
- Collisions are resolved instantaneously
- Material properties are the same no matter what direction a particle approaches
- Composition, configuration, and material properties are known and constant in time
- Only the expected (mean) values of reaction rates are needed

Solution

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Problem 2.

Use integration by parts and l'Hopital's rule to show that:

$$\lambda = \frac{\int_0^\infty x\sigma_t I(x)dx}{\int_0^\infty \sigma_t I(x)dx} = \frac{\int_0^\infty x\mathrm{e}^{-\sigma_t x}dx}{\int_0^\infty \mathrm{e}^{-\sigma_t x}dx} = \ldots = \frac{\frac{1}{\sigma_t^2}}{\frac{1}{\sigma_t}} = \frac{1}{\sigma_t}$$

Solution

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