Collision frequency

Calculate $\nu_{ii}/\nu_{ei}$ for $T_i = 4T_e$ and $m_i = 100m_e$

a) 160

b) 1/4

c) 1/40

d) 1/80
Moments

Which of the following is the fluid velocity $U_s$?

a) $\int d^3v \ (v - U_s)(v - U_s)f_s(x, v, t)$

b) $\frac{\int d^3v \ v f_s(x, v, t)}{\int d^3v f_s(x, v, t)}$

c) $\frac{\int d^3v \ mv^2/2f_s(x, v, t)}{\int d^3v f_s(x, v, t)}$

d) $\int d^3v \ v f_s(x, v, t)$
Compression of Plasma

Consider a cylindrical volume of plasma threaded by a uniform axial magnetic field $B_0$. What is the magnetic field if the plasma is compressed as follows:

![Diagram of plasma compression]

a) $16B_0$

b) $4B_0$

c) $B_0$

d) $B_0/4$
Changes of Plasma Volume

Consider a cylindrical volume of plasma threaded by a uniform axial magnetic field $B_0$. What is the magnetic field if the plasma is changed as follows:

a) $9B_0$

b) $4B_0/9$

c) $B_0/3$

d) $B_0/9$
Consider a cylindrical volume of plasma threaded by a uniform axial magnetic field $B_0$ with a temperature $T_0$. If the plasma is strongly collisional, what is the temperature after this plasma is changed as follows?

\[ R \quad \rightarrow \quad R/2 \]

\[ \frac{L}{4} \quad \rightarrow \quad L \]

a) $T_0/8$

b) $T_0/2$

c) $T_0$

d) $4T_0$
Changes of Plasma Volume

Consider a cylindrical volume of plasma threaded by a uniform axial magnetic field $B_0$. If the plasma is collisionless with initial temperatures, $T_\perp = T_\parallel = T_0$, what are the final temperatures?

![Diagram of a cylindrical volume with radius $R$, length $L/4$, and $R/2$ after some transformation]

a) $T_\perp = 4T_0$, $T_\parallel = T_0/16$

b) $T_\perp = 2T_0$, $T_\parallel = T_0/4$

c) $T_\perp = T_0$, $T_\parallel = T_0$

d) $T_\perp = T_0/4$, $T_\parallel = 4T_0$
Polar Plot of MHD Wave Velocities

Which of the following can be deduced from this polar plot of the Fast, Alfven, and Slow wave velocities?

a) \( c_s > v_A \)

b) \( c_s = v_A \)

c) \( c_s < v_A \)

d) Cannot be determined