A4

1)

(a) $F_D = \rho \times S \times C_D \times \frac{u^2}{2}$

$= \frac{\pi}{4} d_p^2 \rho C_D \frac{u_p^2}{2}$

(b) ストークス

(c) $u_p = \frac{(\rho_p - \rho) g d_p^2}{18\mu}$ であるから $A = \frac{(\rho_p - \rho) g}{18\mu}$ $m = 2$

2) $x_p = -\frac{1}{u_p} \int_H^{y_p} u\, dy$ $\bar{u}$ を用いれば $x_p = -\frac{1}{u_p} \bar{u} [y]_H^{y_p}$

よって

$L = -\frac{1}{u_p} \bar{u}(-H-H) = \frac{2}{u_p} \bar{u} H = 2 \frac{\bar{u}}{u_p} H$

$u_p = \frac{(\rho_p - \rho) g d_p^2}{18\mu} = A d_p^2$

$L = \frac{2\bar{u}H}{A d_p^2}$

よって $d_{p\,min} = \left(\frac{2\bar{u}H}{LA} \right)^{\frac{1}{2}}$