

Geography 416-411
Exercise #6
Moisture Profile
10 points

Name: _____

1. Given the following moisture profile:

z(cm)	5	10	20	30	50	100	150
e(hPa)	8.35	8.13	8.05	7.95	7.85	7.68	7.50

Determine: e_* and Moisture Profile Formula (1st approximation only)

Water Vapor Flux, E (kg / m² s)

Latent Energy Flux, Q (W /m²)

Note: $\rho_{\text{air}} = 1.205 \text{ kg / m}^3$

$C_p = 1005 \text{ J / kg}^\circ\text{K}$

k (von Karman) = 0.39

$u_* = .194 \text{ m/s}$

$z_0 = .012 \text{ m}$

$T_0 = 18.8^\circ\text{C} (292^\circ\text{K})$

Note: Also use for determining L_{evap}

Key Equations: $\text{Slope}_{10} = [(y_2 - y_1) / (L)] / (x_2 - x_1)$

$\text{Slope}_e = 2.303 \text{ Slope}_{10}$

$e_* = 1 / \text{Slope}_e$

$e(z) = e_0 + e_* \ln(z / z_w)$

$z_w = z_h = 0.2 z_0$

$E = (.2165 \text{ kg }^\circ\text{K} / \text{m}^3 \text{ hPa}) (k u_* e_*) / T_0^\circ\text{K}$

$L_{\text{evap}} = (2.5 \times 10^6 \text{ J/kg}) - (2.37 \times 10^3 \text{ T}^\circ\text{C})$ Note: (for $T \geq 0^\circ\text{C}$)

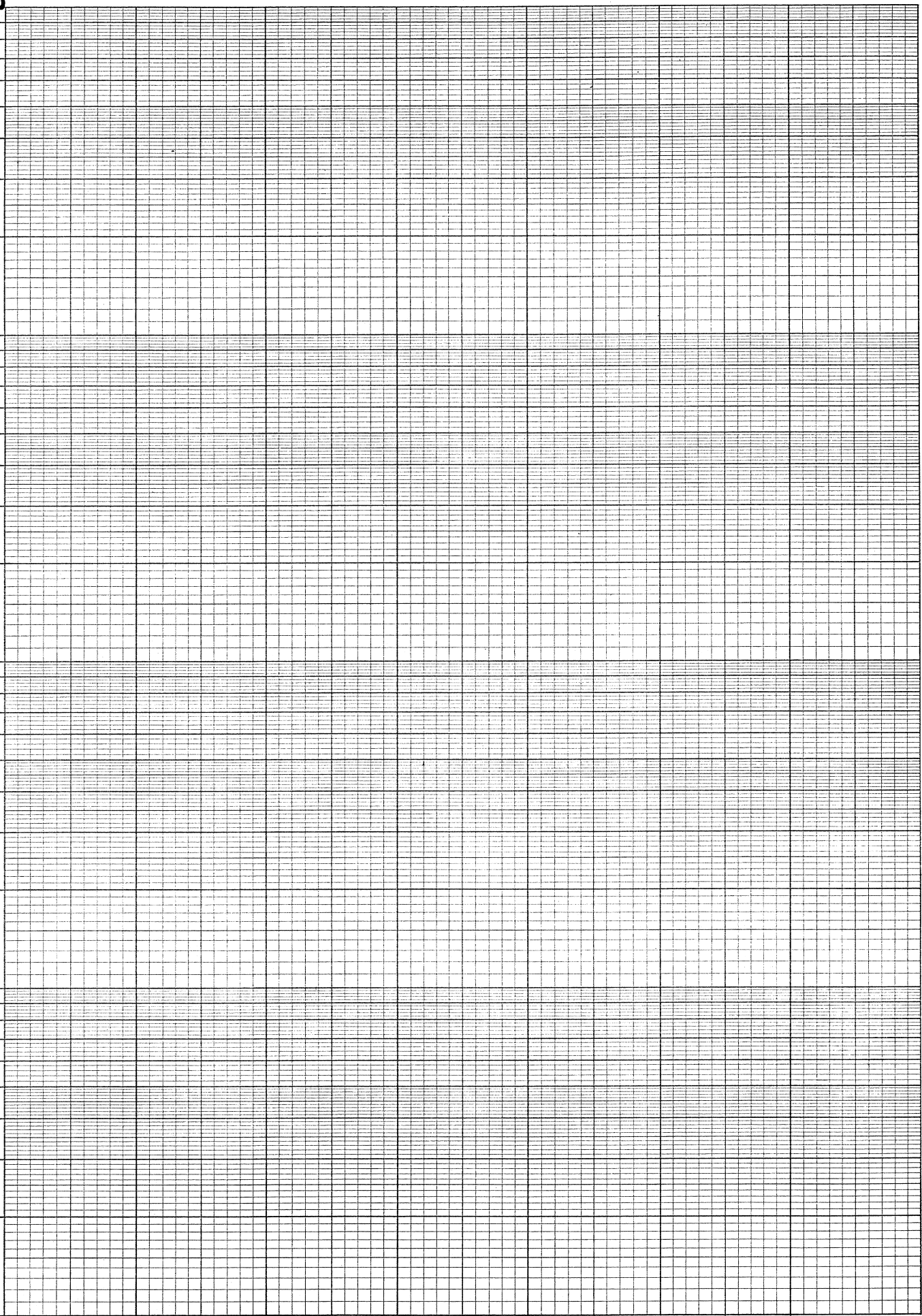
$Q = L_{\text{evap}} E$

1000
9
8
7
6
5
4
3
2

100
9
8
7
6
5
4
3
2

10
9
8
7
6
5
4
3
2

1
.9
.8
.7
.6
.5
.4
.3
.2
.1



Semi-Logarithmic
4 Cycles x 10 to the inch

6.5 7 7.5 8 8.5 9 9.5 10
hPa