$\boxed{3.1}$

$P_{12km} = 19{,}399 \text{ Pa}$

$\rho_{12km} = 0.3194 \text{ kg/m}^3$

$T_{12km} = 216.66 \text{K}$

The altitudes of 12 & 18 km are in the stratosphere (ISOTHERMAL)...

$$\frac{P_{18km}}{P_{12km}} = e^{\frac{-g_0}{RT}(18{,}000-12{,}000 \text{ m})}$$

$$= e^{\frac{-9.81 \text{ m/sec}^2}{(287 \text{ J/kgK})(216.66\text{K})}(6{,}000\text{m})}$$

$$= 0.3881$$

$$P_{18km} = (0.3881)(19{,}399 \text{ Pa}) = \boxed{7{,}528 \text{ Pa}}$$

(App. B = 7,565 Pa) for geometric alt.

$$T_{18km} = T_{12km} = \boxed{216.66 \text{ K}}$$

$$\rho_{18km} = \frac{P_{18km}}{RT_{18km}} = \frac{7528 \text{ Pa}}{(287 \frac{J}{kgK})(216.66\text{K})} = \boxed{0.1211 \frac{kg}{m^3}}$$

(App. B = 0.1217 kg/m³)

3.2 $p = 26{,}500\ Pa$

INTERPOLATION is not required for pressure altitude : $\boxed{h_G = 10{,}000\ m \text{ Pressure Alt.}}$

$$\rho = \frac{p}{RT} = \frac{26{,}500\ Pa}{\left(287\ \frac{J}{kg\,K}\right)(220K)} = 0.4197\ kg/m^3$$

INTERPOLATE...

h_G (m)	ρ (kg/m³)
9800	0.42382
h	0.4197
9900	0.41864

$$h = 9800 + \frac{0.4197 - 0.42382}{0.41864 - 0.42382}(9900 - 9800)$$

$$= 9800 + 79.5 = \boxed{9880\ m \text{ Density Alt.}}$$

3.4 $p = p$ @ $33{,}500\ ft = 535.89\ lb/ft^2$

$\rho = \rho$ @ $32{,}000\ ft = 8.2704 \times 10^{-4}\ slug/ft^3$

$$OAT = T = \frac{p}{\rho R} = \frac{535.89\ lb/ft^2}{\left(8.2704 \times 10^{-4}\ \frac{slug}{ft^3}\right)\left(1716\ \frac{ft\,lb}{slug\,°R}\right)}$$

$$\boxed{T = 377.6\ °R}$$

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

$\boxed{3.10}$

$p = 530 \text{ lb/ft}^2$

$T = 390\,°R$

$$\rho = \frac{p}{RT} = \frac{530 \text{ lb/ft}^2}{\left(1716 \frac{\text{ft lb}}{\text{slug °R}}\right)(390\,°R)} = 7.919 \times 10^{-4} \frac{\text{slug}}{\text{ft}^3}$$

h_G (ft)	p (lb/ft²)
33,500	535.89
h	530
34,000	523.47

$$h = 33{,}500 + \frac{530 - 535.89}{523.47 - 535.89}(34{,}000 - 33{,}500)$$

$$= \boxed{33{,}737 \text{ ft Pressure Alt.}}$$

h_G (ft)	ρ (slug/ft³)
33,000	7.9656×10^{-4}
h	7.919×10^{-4}
33,500	7.8165×10^{-4}

$$h = 33{,}000 + \frac{(7.919 - 7.9656) \times 10^{-4}}{(7.8165 - 7.9656) \times 10^{-4}}(33{,}500 - 33{,}000)$$

$$= \boxed{33{,}156 \text{ ft Density Alt.}}$$