11.33 Saturated water, $T = 50°C$

(a) $h_g - h_f = ?$

Use only (p, v, T) data. Then compare with tabulated h values.

$T(°C)$	p (bar)	$v_f \times 10^3$ (m^3/kg)	v_g (m^3/kg)
45	.09593		
50	0.1235	1.0121	12.032
55	0.1576		

$$\left(\frac{dp}{dT}\right)_{sat} \cong \frac{(.1576 \text{ bar} - .09593 \text{ bar}) \times 10^5 \text{ Pa/bar}}{(55°C - 45°C)}$$

$$\left(\frac{dp}{dT}\right)_{sat} \cong 616.7 \text{ Pa/K} = .6167 \text{ kPa/K}$$

Clapeyron Eqn. $\left(\frac{dp}{dT}\right)_{sat} = \frac{h_g - h_f}{T(v_g - v_f)}$

$$(h_g - h_f) = \left(.6167 \frac{kPa}{K}\right)(323K)(12.032 \text{ m}^3/\text{kg} - 1.0121 \times 10^{-3} \text{ m}^3/\text{kg})$$

$$\boxed{(h_g - h_f) = 2396.5 \text{ kJ/kg}}$$

Table gives: $h_{fg} = 2382.7$ kJ/kg (0.6% difference).

(b) $u_g - u_f = h_g - h_f - p(v_g - v_f) = 2247.9$ kJ/kg

Table gives: $u_{fg} = 2234.2$ kJ/kg (0.6% difference)

(c) $s_g - s_f = (h_g - h_f)/T = 7.4195$ kJ/kg·K. Table gives 7.3725 kJ/kg·K