1.) $T(x) = f(0) + f'(0)(x-0)$

$T(x) = -4 + f'(0)x$ and since $T(\frac{1}{2}) = -3$

$-3 = -4 + f'(0)(\frac{1}{2}) \rightarrow 1 = f'(0)(\frac{1}{2}) \rightarrow f'(0) = 2$

2.) $|\text{error}| \leq \frac{40}{2!}(\frac{1}{4} - 0)^2 = \frac{5}{4}$

$6 - \frac{5}{4} \leq f(\frac{1}{4}) \leq 6 + \frac{5}{4} \rightarrow \frac{19}{4} \leq f(\frac{1}{4}) \leq \frac{29}{4}$

3.) a.) $g(1) = \int_1^1 f(t)\,dt = 0 \quad g'(x) = f(x) \rightarrow g'(1) = 2$

$y = 2(x-1) \rightarrow g(0.5) \approx 2(-.5) = -1$

b.) $|\text{error}| \leq \dfrac{\text{max value of } |g''(x)| \text{ on } [.5, 1]}{2!}(.5-1)^2 = \frac{4}{2}(\frac{1}{4}) = \frac{1}{2}$

$|T(0.5) - g(0.5)| \leq \frac{1}{2}$

4.) a.) $y - 80 = 128(x-2)$

$h(1.9) \approx 80 + 128(-\frac{1}{10}) = 67.2$

$67.2 < h(1.9)$ since $h'(x)$ is increasing on $[1,3]$, $h(x)$ is concave up on $(1,3)$.

b.) $|\text{error}| \leq \dfrac{\frac{488}{3}}{2!}(1.9-2)^2 = \frac{488}{6}(\frac{1}{100}) = \frac{488}{600} < \frac{5}{6}$