a) $g(x) = f(x^2) = x^2 - \frac{x^6}{3!} + \frac{x^{10}}{5!} - \frac{x^{14}}{7!} + \cdots + (-1)^n \frac{x^{4n+2}}{(2n+1)!} + \cdots$

b.) Let $L = \lim_{x \to 0} \frac{x^2 - \frac{x^6}{6} - g(x)}{x^{10}}$

$= \lim_{x \to 0} x^{-10}\left(-\frac{x^{10}}{5!} + \frac{x^{14}}{7!} \cdots\right) = \lim_{x \to 0}\left(-\frac{1}{5!} + \frac{x^4}{7!} \cdots\right)$

$= -1/5!$

c.) $h = \int_0^x g\, dt = \frac{x^3}{3} - \frac{x^7}{7 \cdot 3!} + \frac{x^{11}}{11 \cdot 5!} - \frac{x^{15}}{15 \cdot 7!} + \cdots$

$+ (-1)^n \frac{x^{4n+3}}{(4n+3)(2n+1)!} + \cdots$

$h(1) \approx \frac{1}{3} - \frac{1}{7 \cdot 6} = \text{Approx.}$

d.) ~~Let~~ $|\text{Error}| = |h(1) - \text{Approx.}| \leq \frac{1}{11 \cdot 5!}$

by alt. series remainder thm.

since $\frac{1}{11 \cdot 5!} \leq \frac{1}{1000}$, $|\text{Error}| \leq \frac{1}{1000}$