

$$(a) \quad g(x) = \left(1 + \frac{7-x^3}{x^2}\right)^{\frac{1}{2}}$$

$$g'(x) = \frac{1}{2} \left(1 + \frac{7-x^3}{x^2}\right)^{-\frac{1}{2}} \cdot \frac{-3x^2 \cdot x^2 - 2x(7-x^3)}{x^4}$$

$$g'(x) = \frac{1}{2} \left(\frac{x^2+7-x^3}{x^2}\right)^{-\frac{1}{2}} \cdot \frac{-x^4-14x}{x^4}$$

$$= \frac{1}{2} \frac{x}{(x^2+7-x^3)^{\frac{1}{2}}} \cdot \frac{-x^3-14}{x^3}$$

$$|g'(7^{\frac{1}{5}})| = \frac{1}{2} \frac{1}{(7^{\frac{2}{5}}+7^{\frac{5}{5}}-7^{\frac{3}{5}})^{\frac{1}{2}}} \cdot \frac{7^{\frac{3}{5}}+2 \cdot 7^{\frac{5}{5}}}{7^{\frac{2}{5}}}$$

$$= \frac{1}{2} \frac{1}{(1+7^{\frac{3}{5}}-7^{\frac{1}{5}})^{\frac{1}{2}}} \cdot \frac{1+2 \cdot 7^{\frac{2}{5}}}{1}$$

$$\geq \frac{7^{\frac{2}{5}}}{(1+7^{\frac{3}{5}}-7^{\frac{1}{5}})^{\frac{1}{2}}} = \left(\frac{7^{\frac{4}{5}}}{1+7^{\frac{3}{5}}-7^{\frac{1}{5}}}\right)^{\frac{1}{2}}$$

$$\geq \left(\frac{7^{\frac{4}{5}}}{7^{\frac{3}{5}}}\right)^{\frac{1}{2}} \geq \left(7^{\frac{1}{5}}\right)^{\frac{1}{2}} = 7^{\frac{1}{10}} > 1$$

not convergent