Convergence Condition

There exists an interval $I = [r-c, r+c]$ for some $c > 0$, such that

$|g'(x)| < 1$ on I & $x_0 \in I$

1) $x - \cos(x) = f(x)$

$\Rightarrow g(x) = \cos(x)$

$|g'(x)| = \sin x$

$[0.5, 1) = I$

$\Rightarrow$ converges

$$m = \max_{x \in I} |g'(x)| = \sin 1 < 1$$

2) $g(x) = e^{-2x(x-1)} + x$

$g'(x) = -2e^{-2x(x-1)} + e^{-2x} + x$

$g'(1) = e^{-2} + 1 > 1$

$\Rightarrow$ Diverges