

## Graded Quiz # 06

1) 4.5 according to fixed point equation

$$2) g'(x) = -\pi \sin(\pi x)$$

$$h = |g'(1.2)| = 1.89658$$

$\therefore$  Divergence

$$3) g'(x) = -\frac{58}{x^3}$$

$$h = |g'(6)| = 0.26852$$

$\therefore$  Linear convergence

$$4) g'(x) = \sqrt{\frac{5}{2} (5x+6)^{-\frac{1}{2}}} \times \frac{2}{5}$$
$$= \frac{1}{\sqrt{5x+6}}$$

$h|_{x=2} = 0.25 < 1$ . But, for  $x > -2$ ,  $h < 1$ . That's why converges

to ~~one~~ only  $x = 2$

$$5) g'(x) = \frac{3}{5} \left( \frac{(x-1)(8x-7)}{(x-1)^2} \right)$$
$$= \frac{4x^2 - 8x - 7}{5(x-1)^2}$$

$$h|_{x=-2} = 0.556$$

$$h|_{x=4} = 0.556$$

$\therefore$  Both roots

6) Use calculator

$$-3.05, 2.94, 0.11$$

$$7) x^3 - 9x + 1 = 0$$

$$\Rightarrow 9x = x^3 + 1$$

$$\therefore x = \frac{x^3 + 1}{9} \Rightarrow g(x) = x \Rightarrow f(x) = 0$$

$$x^3 - 9x + 1 = 0$$

$$\Rightarrow x(x^2 + -9) + 1 = 0$$

$$\Rightarrow x = \frac{-1}{x^2 - 9}$$

$$\Rightarrow x = \frac{1}{9 - x^2} \Rightarrow g(x) = x$$

$$8) g'(x) = \frac{1}{3} (9x-1)^{\frac{-2}{3}} \times 9 \\ = 3(9x-1)^{\frac{-2}{3}}$$

$$h|_{x=-3.05} = 0.421 \Rightarrow h < 1$$

$$h|_{x=2.94} = 0.397 \Rightarrow h < 1$$

$$h|_{x=0.11} = 64.63 \Rightarrow h > 1$$

∴ It will converge to two roots

a)

$$a) \quad p_1 = g(p_0) = 2.85618$$

$$p_2 = g(p_1) = 2.91250$$

$$p_3 = g(p_2) = 2.93228$$

$$b) \quad \text{Error bound} = |p_3 - p_2| \\ = |2.93228 - 2.91250| \\ = 0.01978$$