Q3) a) i) $y = x^3 - 7x^2 + 8x - 0.35 \quad x = 1.37$

$$f(1.37) = (1.37)^3 - 7(1.37)^2 + 8.137 - 0.35 = \underline{0.043053}$$

ii) $$\underbrace{(1.37)^3}_{2.57} - 7\underbrace{(1.37)^2}_{-13} + \underbrace{8(1.37)}_{10.9} - 0.35 = \underline{0.12}$$

(3 significant digits) chop

$$\varepsilon_t = \left| \frac{0.043053 - 0.12}{0.043053} \right| \cdot 100\% = \underline{178.7\%}$$

iii) $p(x) = ((x-7)x + 8)x - 0.35$

$x = 1.37$

$$= ((\underbrace{1.37-7}_{-7.71})\cdot 1.37 + 8)\cdot 1.37 - 0.35 = \underline{0.047}$$

-0.29 $\quad 0.397$

$$\varepsilon_t = \left| \frac{0.043053 - 0.047}{0.043053} \right| \cdot 100\% = \underline{9.2\%}$$

Part b)

$$f(x) = f(x_1) + f'(x_1)(x - x_1) + \frac{1}{2!}\cdot f''(x_1)(x-x_1)^2 + \frac{1}{3!}\cdot f'''(x_1)(x-x_1)^3$$

$$+ f^4(x_1)(x - x_1)\cdot\frac{1}{4!} + f^5(x_1)(x - x_1)\cdot\frac{1}{5!}$$

Q4) a) $x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$ → Newton formula

$x - \frac{1}{2} = \frac{x^5 + y^5}{20}$ → $20x - 10y - \cancel{x}^5 = h(y)$

$h'(y) = -4x^5 - 10y + 20$

b) there was no general criteria but convergence depends on:

1) Accuracy of the initial guess

2) Nature of the function.

And I think, every iterative method stops when the error is too low.