Answer and hints of tutorial Sheet - 5 **SPRING 2017**

MATHEMATICS-II (MA10002) *January 13, 2017*

1. The system of equations are reduced to an upper triangular system from which the unknowns are found by back substitution.
   Answer:- (a) $x_1 = \frac{117}{71}, x_2 = \frac{-81}{71}, x_3 = \frac{148}{71}$.
   Answer:- (b) $x_1 = 0.549147, x_2 = 0.560250, x_3 = 0.434547, x_4 = 0.689700$.

2. First make the system of equations diagonally dominant. Take initial approximation as $(0, 0, 0)$.
   Answer:- (a) $x_1 = 0.4438, x_2 = 0.5626, x_3 = 0.3238, x_4 = 0.7232$.
   Answer:- (b) $x_1 = 0.4000, x_2 = 0.3333, x_3 = -0.9333$.
   Answer:- (c) $x_1 = 0.3770, x_2 = 0.1685, x_3 = -0.1835, x_4 = -0.3693$.

3. Choose an interval $[2, 3]$ and start the method.
   Answer:- $x = 2.7065$.

4. Same as problem 3, Answer:- 2.94.

5. One root is lying between 0.5 and 0.8. For the equation, form different $x = \Phi(x)$ and examine whether $|\Phi'(x)| < 1$ in the desired interval and proceeds.
   Answer:- 0.6823.

6. Same as problem 5, Answer:- 1.3141.

7. Answer:- $x = 0.6071$ correct upto 4-decimal places.

8. Answer:- $x = 1.664563$.

9. Put $m = 2$ and compute.

10. Expand $f(x)$ about the point x_0 by Taylor's series and take the second approximation, that is ignore the third and higher order derivatives.

11. Use the relation $|\xi - x_{n+1}| \leq \dfrac{c}{1-c}|x_{n+1} - x_n|$, where $n = 0, 1, 2...$ and $c = |f'(\xi)|$, $0 < c < 1$. Answer: $n \geq 11$.

12. The root lies between $(2.3625, 2.36875)$ and the root is 2.365625.

13. Use $f(x) = x^n - a$.

14. Use the relation $|\xi - x_n| < c^n|\xi - x_0|$, where $c = |g^{'}(\xi)|$. Answer:- $n \geq 6$.

15. Answer:- 1.679631.