Numerical Methods TIC
HOMEWORK II

Juan David Rojas Gacha

16 de septiembre de 2018

Display all the iterations.

1. The velocity v of falling parachutist is given by:

$$v = \frac{gm}{c}(1 - e^{-\frac{ct}{m}})$$

where $g = 9{,}82 m/s^2$. For a parachutist with a drag coefficient $c = 15 kg/s$, compute the mass so that the velocity is $v = 36 m/s$ at $t = 10s$. Use the modified false-position method, the secant method and the Newton-Raphson method to determine m to a level of $e_r = 5 \cdot 10^{-4}$.

2. Locate the first positive root of

$$f(x) = \sin x + \cos(1 + x^2) - 1$$

where x is in radians. Use the secant method with initial guesses of (a) $x_0 = 1, x_1 = 3$, (b) $x_0 = 1{,}5, x_1 = 2{,}5$, and (c) $x_0 = 1{,}5, x_1 = 2{,}25$ to locate the root, $e_r = 5 \cdot 10^{-3}$. (d) Sketch the plot with the results for each iteration shown and explain your results.

3. Player A will shout out (win by a score of 21-0) player B in a game of racquetball with probability

$$P = \frac{1+p}{2}\left(\frac{p}{1 - p + p^2}\right)^{21},$$

where p denotes the probability A will win any specific rally (independent of the server). Determine, to within 10^{-4}, the minimal value of p that will ensure that A will shut out B with a probability of 0.5.

4. The sum of two numbers is 20. If each number is added to its square root, the product of the sums is 155.55. Determine the two numbers to within $e_r = 5 \cdot 10^{-5}$ Use the Newton-Rapshon method.