1. To rewrite newton's method in book 7.1 by using (for & if break)

2. Function handle: (a) Find the minimum value for the function $y = 1 + e^{-0.2x}\sin(x+2)$, for the interval of $0 < x < 10$. (Ans: (x,y)=(2.515, 9.0). (Use fminbnd)

   (b) Use fplot to plot this function for the interval of $0 < x < 10$.

   (c) Write this function as the parametric form, that is $y = 1 + e^{-0.2x}\sin(x+c)$, where c is the parameter.

   Do the same thing as (a) & (b), by given c=2.5.

3. 7.2 Write a script `newquot.m` which uses the Newton quotient $[f(x+h) - f(x)]/h$ to estimate the first derivative of $f(x) = x^3$ at $x = 1$, using successively smaller values of h: 1, 10^{-1}, 10^{-2}, etc. Use a function M-file for $f(x)$.

   Rewrite `newquot` as a function M-file able to take a handle for $f(x)$ as an input argument.

4. 7.4 Write and test a function `swop(x, y)` which will exchange the values of its two input arguments.

5. 7.5 Write your own MATLAB function to compute the exponential function directly from the Taylor series:

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots$$

   The series should end when the last term is less than 10^{-6}. Test your function against the built-in function `exp`, but be careful not to make x too large—this could cause rounding error.

6. 7.6 If a random variable X is distributed normally with zero mean and unit standard deviation, the probability that $0 \le X \le x$ is given by the standard normal function $\Phi(x)$. This is usually looked up in tables, but it may be approximated as follows:

$$\Phi(x) = 0.5 - r(at + bt^2 + ct^3),$$

   where $a = 0.4361836$, $b = -0.1201676$, $c = 0.937298$, $r = \exp(-0.5x^2)/\sqrt{2\pi}$, and $t = 1/(1 + 0.3326x)$.

   Write a function to compute $\Phi(x)$, and use it in a program to write out its values for $0 \le x \le 4$ in steps of 0.1. Check: $\Phi(1) = 0.3413$.

7.

7.8 The Fibonacci numbers are generated by the sequence

$$1, 1, 2, 3, 5, 8, 13, \ldots$$

Can you work out what the next term is? Write a recursive function `f(n)` to compute the Fibonacci numbers F_0 to F_{20}, using the relationship

$$F_n = F_{n-1} + F_{n-2},$$

given that $F_0 = F_1 = 1$.

8.

7.9 The first three Legendre polynomials are $P_0(x) = 1$, $P_1(x) = x$, and $P_2(x) = (3x^2 - 1)/2$. There is a general *recurrence* formula for Legendre polynomials, by which they are defined recursively:

$$(n + 1)P_{n+1}(x) - (2n + 1)xP_n(x) + nP_{n-1}(x) = 0.$$

Define a recursive function `p(n,x)` to generate Legendre polynomials, given the form of P_0 and P_1. Use your function to compute `p(2,x)` for a few values of `x`, and compare your results with those using the analytic form of $P_2(x)$ given above.