This assignment is due on Tuesday, October 6th. The written component below is due at 5PM. You can
turn it in at the Course mailbox on the 4th floor of the Mathematics building (just outside room 408).
There is an additional component to the homework which you must access through WebAssign. This part
of the assignment is due on Tuesday, October 6th as well by 11:59 PM.

(1) Do the following exercises from the book: Section 2.6, Exercises 32, 52, 54, 60, 62, 72, 74; Section
2.7, Exercises 48, 50, 64, 68; Section 2.8, Exercises 14, 16.

(2) Let’s work through an offhand comment I made once: I claimed that every quadratic polynomial
which can be written in the form

\[(ax + b)^2 + C\]

where \(ax + b\) is a linear polynomial and \(C > 0\) CANNOT be factored into two linear terms.

(a) First, explain (in words) why solving the equation

\[(ax + b)^2 + C = 0\]

helps to factor that quadratic polynomial.

(b) Now, explain using properties of real numbers why \((ax + b)^2 + C = 0\) has no real solutions when
\(C > 0\).

(c) Let’s explain why this is graphically. How can we get the function \(f(x) = (ax + b)^2 + C\) from
the function \(g(x) = x^2\) by a series of scalings and shifts?

(d) What does this scaling and shifting do to the graph of \(g(x) = x^2\)? Can you conclude my claim
from this?

(3) Here’s a related problem. Use a similar argument as in (2). to convince me that you CANNOT write

\[x^4 + 2x^2 + 1 = (x - \alpha)(x^3 + ax^2 + bx + c)\]

where \(\alpha\) is a real number and where \(x^3 + ax^2 + bx + c\) is a cubic polynomial with real coefficients
\(a, b, c\). Can you factor \(x^4 + 2x^2 + 1\) as the product of two quadratic polynomials?