**Exercise 4.1.** Prove that when \( k \) is even the Alexander polynomial of the \( k \)-twist knot (see [http://en.wikipedia.org/wiki/Twist_knot](http://en.wikipedia.org/wiki/Twist_knot)) is

\[
-\frac{k}{2}t + (k + 1) - \frac{k}{2}t^{-1}.
\]

**Exercise 4.2.** Compute the Alexander polynomials of each of these two knots. You should use a computer algebra system.

![Knots](image1.png)

**Exercise 4.3.** Show that if \( L \) is a split link then \( \Delta_L(t) = 0 \).

**Exercise 4.4.** Show that if two knots cannot be distinguished by their Alexander polynomials then they cannot be distinguished by their colourability.

**Exercise 4.5.** Show that the figure 8 knot and the \( 5_1 \) knot, shown below, cannot be distinguished by their colourability but have distinct Alexander polynomials.

![Knots](image2.png)

**Exercise 4.6** (Medium). For what \( k \) is there a knot \( K \) such that

\[
\Delta_K(t) = 3t + k + 3t^{-1}.
\]