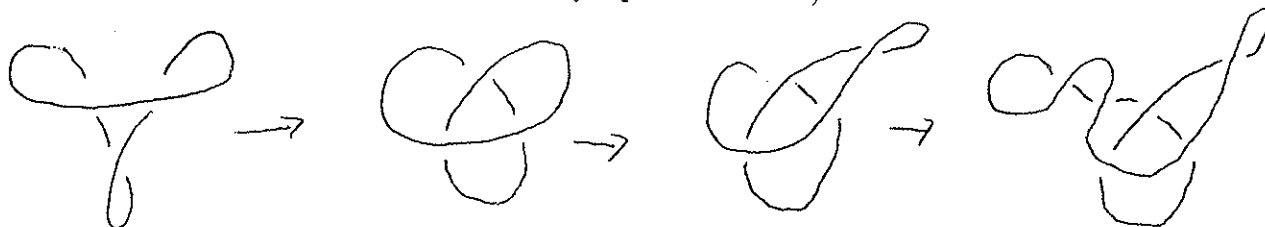


Write your name and student number at the top of your assignment before handing it in. Staple all pages together. Post the assignment in the Green Post-Box on the ground floor in the Maths building before 16:00 on Monday.

1. Sketch the following curves and determine whether or not they are open or closed and, if closed, whether they are a simple closed curves. If it is a simple closed curve, then say what is its period.

- (a) $\gamma(t) = (t^2, t^4, 0)$, $t \in (0, 1)$
- (b) $\gamma(t) = (t \cos t, t \sin t, 0)$, $t \in (0, \infty)$
- (c) $\gamma(t) = (t \cos t, t \sin t, t)$, $t \in (0, \infty)$
- (d) $\gamma(t) = (0, \cos(2t), \sin(2t))$, $t \in (-\infty, \infty)$.
- (e) $\gamma(t) = (\cos^2 t \cos t, \cos^2 t \sin t, 0)$.

2. Show which Reidemeister move is being used (and where) in each step of the following transformations (you may use move III in any equivalent form):



3. Show that the following knot diagram can be transformed into the unknot by four Reidemeister moves.



4. (a) Explain in detail why, if a knot diagram is tricolourable, it remains tricolourable after making a Reidemeister move III (this is also true under moves I, II).
(b) Check in question 2 that the tricolourability is the same when computed for the diagrams at the start and at the end of the sequence of moves.
5. Determine which knots with ≤ 5 crossings in the handout are tricolourable. Show your reasoning.