MAT347Y1 HW15 Marking Scheme

Friday, February 26

Total: 24 points.

13.2.7: 5 points.

- (1) $\mathbb{Q}(\sqrt{2}+\sqrt{3}) \subseteq \mathbb{Q}(\sqrt{2},\sqrt{3})$
- (2) $\mathbb{Q}(\sqrt{2},\sqrt{3}) \subseteq \mathbb{Q}(\sqrt{2}+\sqrt{3})$
- (1) $[\mathbb{Q}(\sqrt{2}+\sqrt{3}) : \mathbb{Q}] = 4$
- (1) minimal polynomial

13.2.13: 4 points.

13.2.14: 4 points.

13.2.18:

(a) 5 points: Gauss' Lemma (1), switching t and X (1), linear polynomials *with relatively prime coefficients* are irreducible (2), and show that x is a root (1).

(b) 3 points. Note that the degree of a sum of polynomials is NOT in general equal to the maximum of the degrees (consider the polynomials x^2+x and $-x^2+x$), so you need to show that this sort of canceling of highest-order terms doesn't happen in this case (this is easy: you just need $t \notin k$).

(c) 3 points.