MAT347Y1 HW10 Marking Scheme

Friday, December 4

Total: 31 points.

7.1.14:

(a) 2 points. If you claim $x \neq 0$ is a zero divisor by saying $xy = 0$ for some y, you also need $y \neq 0$.

(b) 1 point.

(c) 2 points.

(d) 2 points.

7.1.25:

(a) 2 points.

(b) 2 points.

(c) 3 points. Note that this ring is not commutative, so $xy = 1$ does not imply $yx = 1$ (there are rings in which some elements have an inverse on the right but none on the left - these are not units!)

7.3.12:

(a) 3 points (nonempty, subtraction, multiplication)

(b) 4 points (respects addition, respects multiplication, bijective)

(c) 5 points.

7.3.21: 5 points.

- (3) the set of matrix entries, J, is an ideal.
- (2) $M_n(J) = I$

Note: If you want to show some $J \subseteq R$ is an ideal, proving it's a subring first is actually doing more work than necessary. You need to show $ab \in J$ for all $a, b \in J$ to show it's a subring, but you eventually need to show $ar, ra \in I$ for any $a \in I$, $r \in R$, which implies the first statement. So instead of checking both, *replace* the "closed under multiplication" check with the "closed under multiplication by anything in R" check.