Comments on MATH10222/11222 Exam Section A

Question One

(i)

Mostly well done. Common mistakes included misidentifying the equation as linear and failing to point out that the theorem only guarantees a *local* solution.

(ii)

Many students failed to realise that there is an asymptote at $y = 0$ and the resulting integral curves were then often unclear.

(iii)

Mostly well done although many students clearly did not read the question properly as they did not state whether the solution exists for all x. They gained the mark for this last part so long as they were clear that there were issues at $x = 1$ as the question did not explicitly ask for what range of x the solution existed.

Question Two

A lot of students did not know that $-\ln(x) = \ln(1/x)$. Many forgot to multiply both sides of the equation by the integrating factor.

Question Three

Mostly very well done.

Question Four

Occasional problems with the ICs at $\mathcal{O}(\epsilon)$. Students tended to forget that they had to work out the solution of the homogeneous ODE as well as the particular solution at $\mathcal{O}(\epsilon)$.

Question Five

Mostly well done. However, a surprising number of students didn't just replace y'' by v' (thus reducing the equation to a 1st order ODE) but tried to differentiate by what looked like the chain rule... Very odd!

MATH10222, 2017, exam feedback

Section B, comments on the scripts:

B6. This question was mostly very well done, being a minor variation on the theme of projectiles in a uniform gravitational field. There were still some scripts that confused vectors and scalars, or did not distinguish between the two in terms of the notation.

B7. Apart from the odd algebraic error this was generally well answered, being a fairly standard 'potential well' question. Surprisingly few students could answer the very last part – this material was covered at some length in the lecture notes and the methodology was repeated in a final revision lecture when covering the sample exam paper.

B8. A standard 'path equation' question. Those with agood grasp of the chain rule were able to derive the path equation without too much effort. The solution of the path equation in part (ii) was generally well answered.

A handful of students did not understand that the "dot notation" indicates differentiation with respect to time – this was used quite extensively in *both* halves of the lecture course. Those without a good grasp of the chain rule often attempted to 'bluff' their way to the stated path equation result, with a corresponding lack of achieved marks.

B9. This was the least popular question, but essentially reduced to finding the integral of F_{ring} from 0 to R. A few responses over-complicated the integral, which can be obtained directly and relatively simply, for example by substitution of $s = h^2 + r^2$.