

## Practice for Quiz 2

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MATH1903: Integral Calculus and Modelling (Advanced)

Semester 1, 2012

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Lecturers: Daniel Daners and James Parkinson

**Family Name:** .....

**Other Names:** .....

**SID:** ..... **Day:** .....

**Time:** ..... **Room:** .....

**Signature:** .....

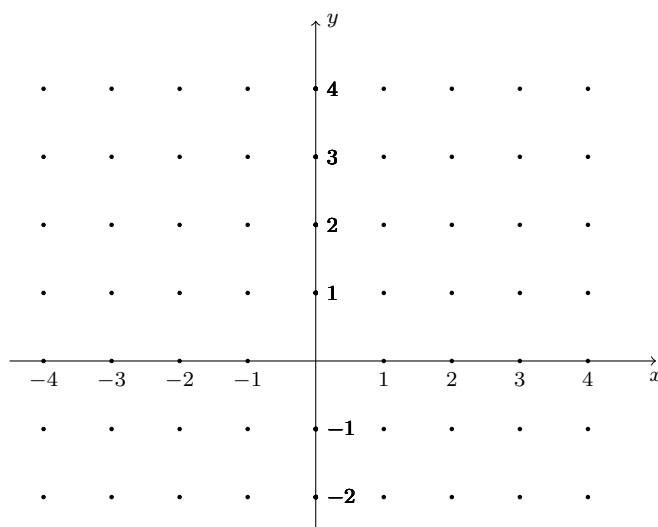
*Please write your final answers, and only your final answers, in the answer boxes.*

**Please note:**

- (a) There are 10 questions, each worth 1 mark. Half marks will **not** be awarded.
- (b) Working will **not** be marked. Marks will be awarded on the basis of answers only.
- (c) Answers will only be marked if they are in the answer boxes on the answer sheet.
- (d) Non-programmable, non-graphics calculators **are** permitted.
- (e) There is some space for working. No other paper is allowed.
- (f) You have 40 minutes to complete the quiz.

1. Sketch the direction field of the differential equation  $y' = y(y - 2)$  in the region below.

Answer Q1:



2. Find the general solution of the differential equation  $y' = -2y^2$ .

Answer Q2:

3. Find the particular solution of the differential equation  $u' = \frac{u}{x^2}$  with  $u(-1) = 2$ . Indicate for which  $x$  it is defined.

Answer Q3:

4. Find an integrating factor for the differential equation  $y' = y \tan x + e^x$

Answer Q4:

5. Suppose that  $x(t)$  satisfies the differential equation  $x' + x^3 = 2x$ . Find the differential equation for  $v = \frac{1}{x^2}$ .

Answer Q5:

6. Find the general solution of the differential equation  $y' - 2y = x$ .

Answer Q6:

7. Compute the partial fraction decomposition of  $\frac{1}{(x+2)(x-5)}$ .

Answer Q7:

8. Find the particular solution of  $xy' + y = \sin x$  with  $y(\pi) = 2$ .

Answer Q8:

9. A population  $P$  of animals grows proportionally to the size of the population. A number of animals is removed at a constant rate  $N$ . Write down a differential equation modelling the size of the population as a function of time.

Answer Q9:

10. Compute the general solution of  $x^2y' + 2y = y^2 + 1$ .

Answer Q10: