DO NOT TURN OVER UNTIL INSTRUCTED TO DO SO.

CALCULATORS ARE NOT PERMITTED

YOU MAY USE YOUR OWN BLANK PAPER FOR ROUGH WORK

SO AS NOT TO DISTURB OTHER STUDENTS, EVERYONE MUST STAY UNTIL THE EXAM IS COMPLETE

REMEMBER THIS EXAM IS GRADED BY A HUMAN BEING. WRITE YOUR SOLUTIONS NEATLY AND COHERENTLY, OR THEY RISK NOT RECEIVING FULL CREDIT

Name and section: _____

GSI's name: _____

This exam consists of 5 questions. Answer the questions in the spaces provided.

1. Compute the following integrals:

   (a) (10 points)

   $$\int xe^{2x}dx.$$

   Solution:

   (b) (10 points)

   $$\int \frac{x^2}{(x^3+2)^3}dx$$

   Solution:

2. (20 points) A company projects that over the next year they will have a continuous income stream with income rate $5000t^2$ dollars per year. If they intend to invest their income in an account with a 50% interest rate, what is the present value of the company's earning over the next year?

   Solution:

3. (20 points) Find a general solution to the following differential equation:

$$2xy' + y = 4x\ln(x)$$

Solution:

4. (a) (10 points) Find a general solution to the following differential equation:

$$y' = \frac{xe^{-y^2}}{y}$$

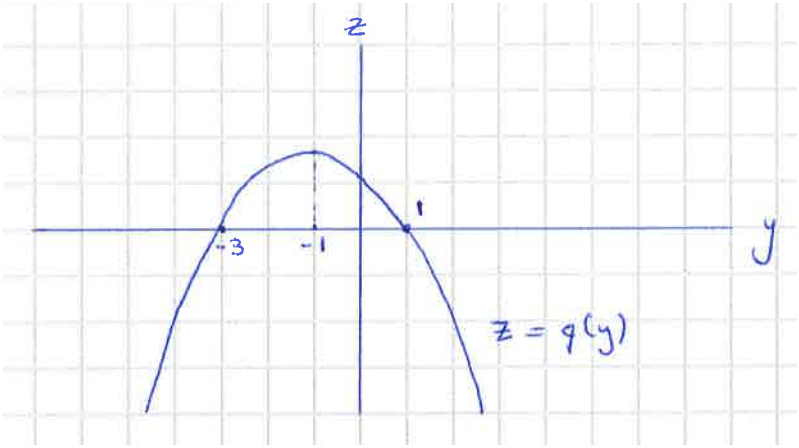
Solution:

(b) (5 points) Using part(a) find a solution which satisfies the initial condition

$$y(0) = -1.$$

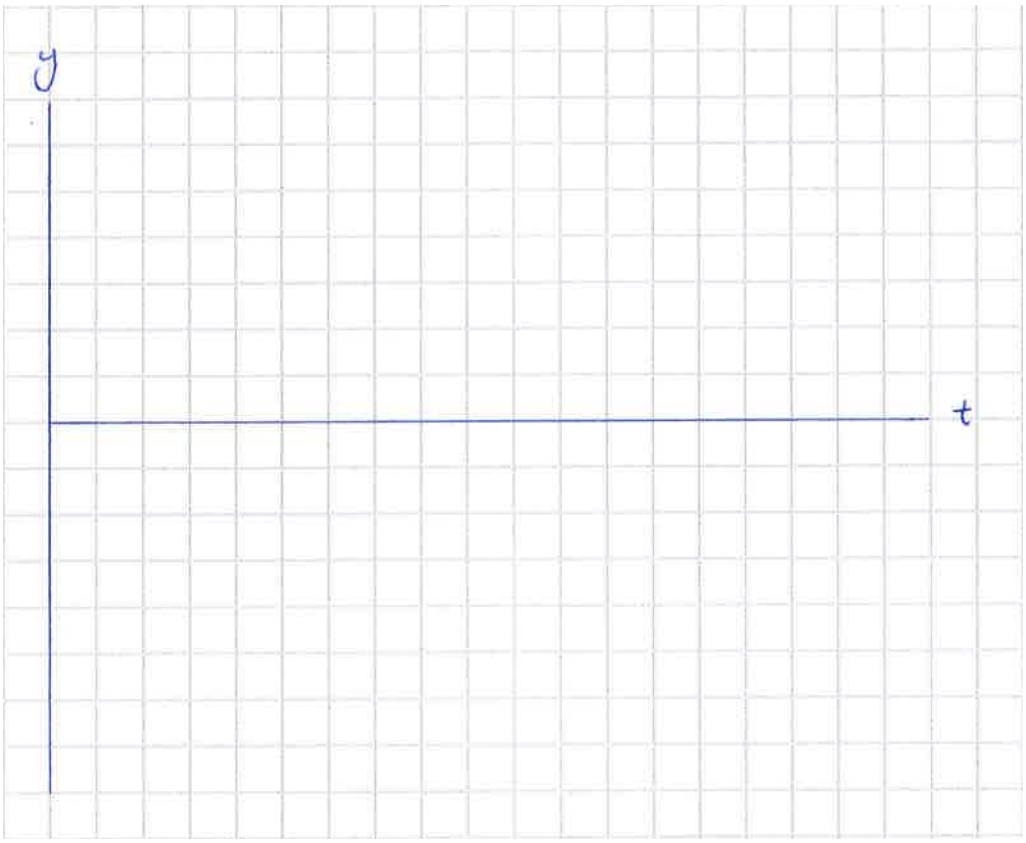
Solution:

5. (20 points) Consider the differential equation of the form $y' = q(y)$, where the graph of $z = q(y)$ is as follows:



Sketch a solution for each of the following initial conditions: $y(0) = -3$, $y(0) = -2$ and $y(0) = 2$.

Solution:



END OF EXAM