

For full credit, you must show all work and circle your final answer.

- 1 Given the differential equation below, draw the isoclines for the given values and use them to sketch the slope field.

$$c = -2, -2, 0, 1, 2 \quad \frac{dy}{dx} = x^2 - y$$

- 2 For the following differential equations give the order and classify as linear or non-linear

a)  $x^2 \frac{dy}{dx} + 2y = 7x$

b)  $\frac{1}{y} \frac{d^2y}{dx^2} + y = \sin(x)$

- 3 Verify whether or not the following is a solution to the differential equation.

$$\varphi(x) = \sin(x) + x^2; \quad \frac{d^2y}{dx^2} + y = x^2 + 2$$