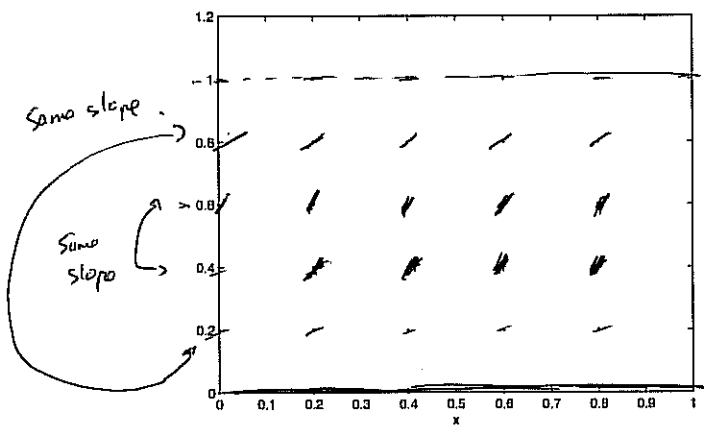


Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. Please write down all relevant mathematics. You have 20 minutes.

1. Sketch the slope field for the differential equation

$$\frac{dy}{dx} = y(1-y)$$

and solve for the constant solutions and graph them on the slope field.



$y=1, \frac{dy}{dx} = 0$
 $y=0.8 \Rightarrow \frac{dy}{dx} = .16$
 $y=0.6 \Rightarrow \frac{dy}{dx} = .24$
 $y=0.4 \Rightarrow \frac{dy}{dx} = .24$
 $y=0.2 \Rightarrow \frac{dy}{dx} = .16$

$f \ y = \text{constant},$
 $\frac{dy}{dx} = 0$
 $0 = y(1-y)$
 $\text{So } y=1 \text{ or } y=0.$

2. Evaluate:

$$\int_0^{\infty} 9e^{-9x} dx$$

$$= \lim_{b \rightarrow \infty} \int_0^b 9e^{-9x} dx = \lim_{b \rightarrow \infty} \left[-e^{-9x} \right]_0^b = \lim_{b \rightarrow \infty} \left[-\frac{1}{e^{9b}} + 1 \right]$$

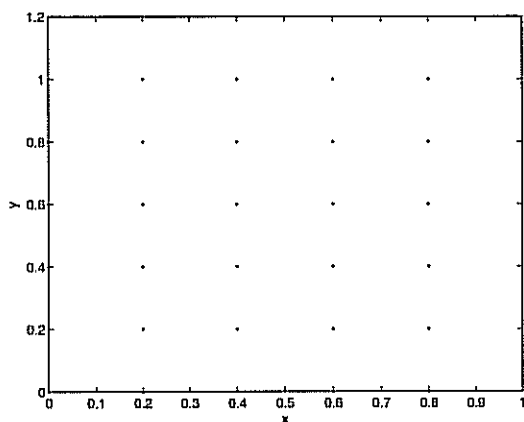
$$= 1$$

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. Please write down all relevant mathematics. You have 20 minutes.

1. Sketch the slope field for the differential equation

$$\frac{dy}{dx} = y(1 - y)$$

and solve for the constant solutions and graph them on the slope field.



2. Evaluate:

$$\int_2^{\infty} \frac{1}{x \ln(x)} dx$$

$$= \lim_{b \rightarrow \infty} \int_2^b \frac{1}{x \ln(x)} dx = \lim_{b \rightarrow \infty} \ln(\ln(x)) \Big|_2^b$$

$$u = \ln(x)$$

$$du = \frac{1}{x} dx$$

$$= \lim_{b \rightarrow \infty} \ln(\ln(b)) - \ln(\ln(2))$$

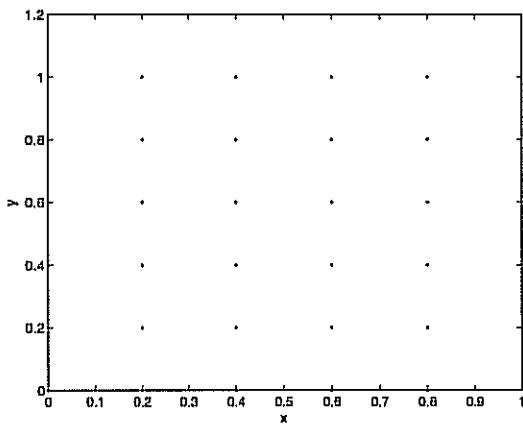
Diverges

Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. Please write down all relevant mathematics. You have 20 minutes.

1. Sketch the slope field for the differential equation

$$\frac{dy}{dx} = y(1-y)$$

and solve for the constant solutions and graph them on the slope field.



2. Evaluate:

$$\int_0^4 \frac{1}{4-x} dx$$

$$= \lim_{a \rightarrow 4^-} \int_0^a \frac{dx}{4-x} = \lim_{a \rightarrow 4^-} \left(-\ln|4-x| \right) \Big|_0^a$$

$$\left(\begin{array}{l} u = 4-x \\ du = -dx \end{array} \right)$$

$$= \lim_{a \rightarrow 4^-} \left(-\ln(4-u) + \ln(4) \right)$$

Diverges to ∞ .

Diverges.