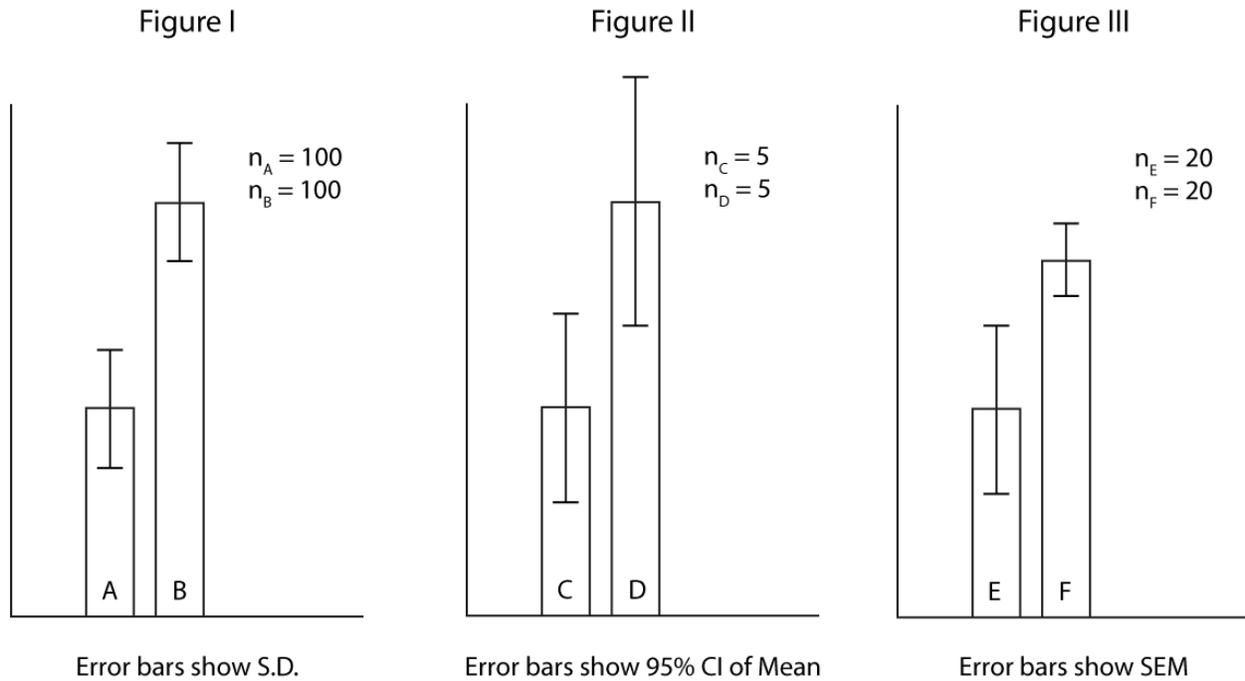


Name:

Question 1

Each of the figures below shows the comparison of the means of a measured value of two groups.



A) In Figure I, do the means of A and B show a statistically significant difference (use 95% confidence)? Explain your reasoning.

B) In Figure II, do the means of C and D show a statistically significant difference (use 95% confidence)? Explain your reasoning.

Name:

C) In Figure III, do the means of E and F show a statistically significant difference (use 95% confidence)? Explain your reasoning.

D) Explain the difference between statistical significance and clinical or scientific significance.

Name:

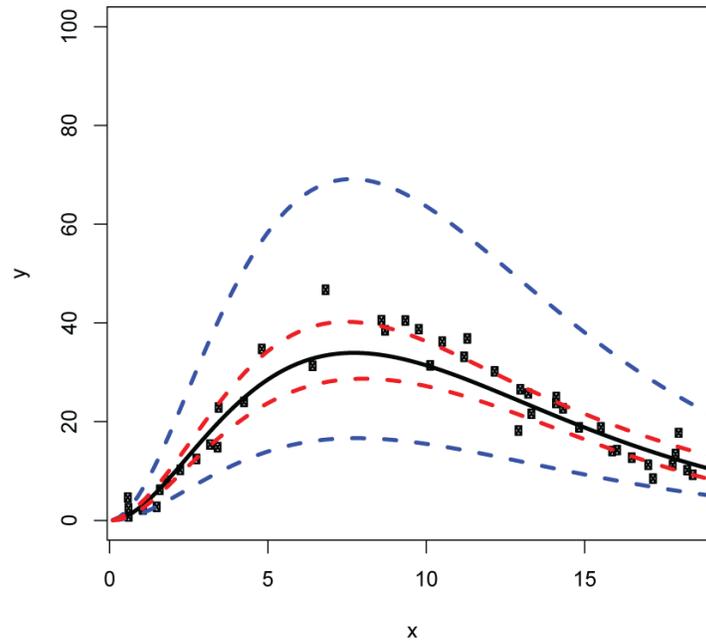
Question 2

Explain the difference between a prospective and a retrospective study. What are the advantages and disadvantages of a retrospective study?

Name:

Question 3

The figure below was generated in R by fitting a dataset of 45 (x,y) points to a linearized model of the equation $y = \alpha \cdot x^\beta \cdot e^{-x/\gamma}$. The black curve shows values for y predicted by the linearly regressed model (using the `predict` function). The red curves were generated using the `predict` function with the argument `interval='c'`, and the blue curves were generated using the `predict` function with the argument `interval='p'`.



A) Transform the model equation above into a form suitable for linear regression.

B) Explain the meaning of the envelope defined by the red (inner) curves.

Name:

- C) Explain the meaning of the envelope defined by the blue (outer) curves.
- D) What would you expect to happen to the area of the red (inner) envelope if additional data were collected and the model was re-fit with $n=450$?
- E) What would you expect to happen to the area of the blue (outer) envelope if additional data were collected and the model was re-fit with $n=450$?
- F) Explain the difference between linear and non-linear regression. What are the advantages and disadvantages of each?

Name:

Question 4

A linear difference model in two variables, x and y , has eigenvalues...

$$\begin{aligned}\lambda_1 &= 1.5 \\ \lambda_2 &= -0.5\end{aligned}$$

...and corresponding eigenvectors...

$$v_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \quad v_2 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

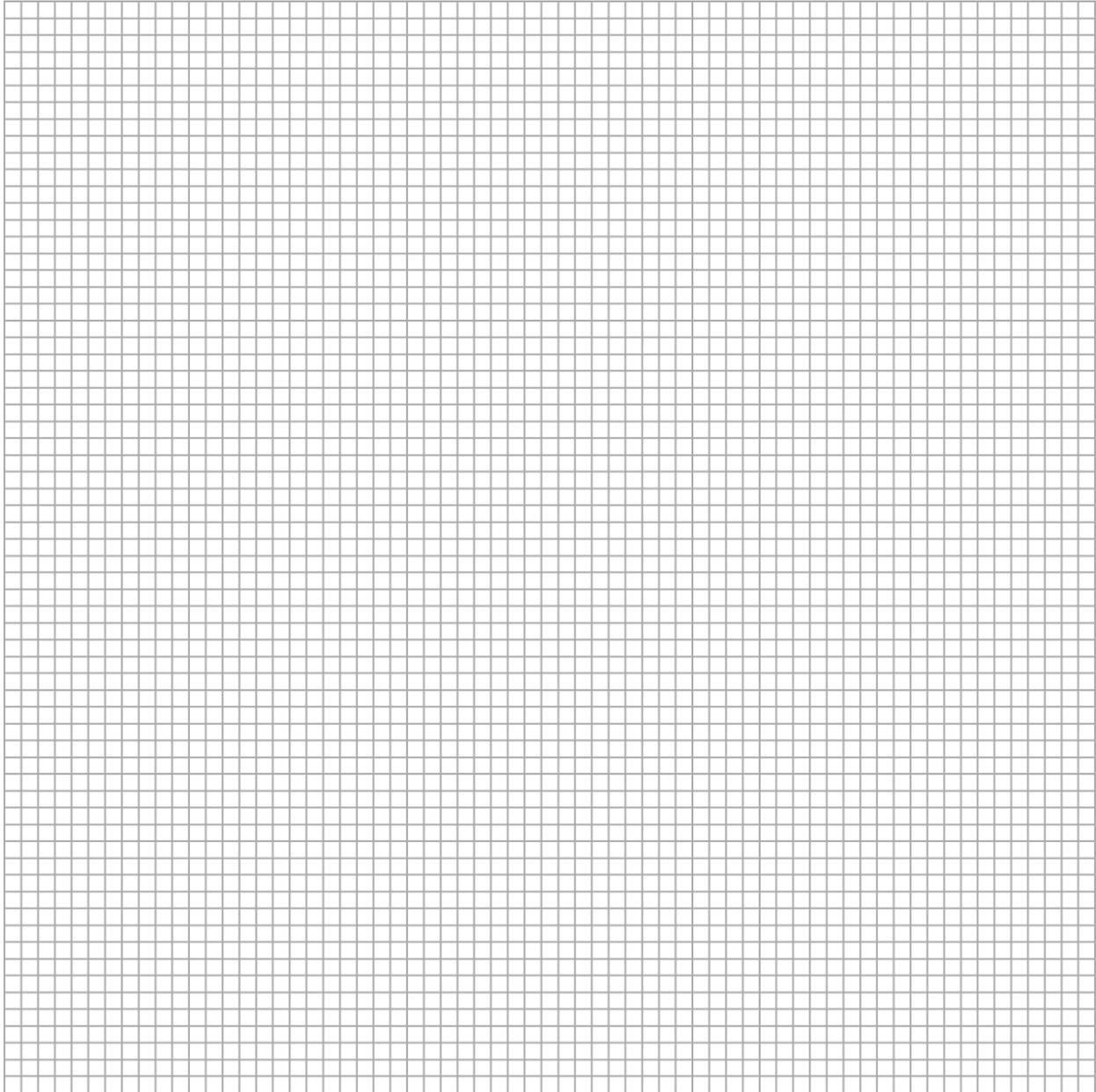
Take the initial condition for this model to be $x=32, y=0$.

A) Write expressions for x_t and y_t in terms of t .

B) What can you say about the long-term behavior of the system?

Name:

C) Sketch the first four steps of the evolution of the system.



Name:

(just another blank grid in case you need it)



