

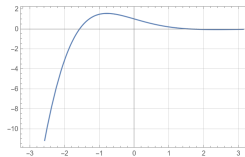
MATH 231.FA22 PRACTICE MAKEUP TEST 3

Solve the following exercises concisely explaining all solution steps. Answers without presentation of justification of solution steps are not awarded credit. (35 minutes, 1.5 course points per multiple choice question, 4 course points per free-form question)

1. What is the linear approximation $L(x)$ of $f(x) = x \ln(x) + 1$ near $x = 1$?

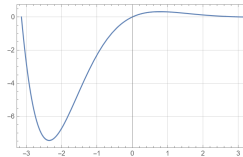
- a) $L(x) = \ln(x) + 1$.
- b) $L(x) = x \ln(x)$.
- c) $L(x) = 1 - x$.
- d) $L(x) = x$.

2. What is the plot of the function $f(x) = e^{-x} \sin(x)$? Provide a brief motivation.



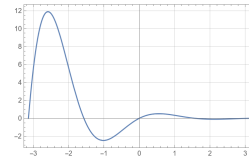
(a)

Why, or why not?



(b)

Why, or why not?



(c)

Why, or why not?

3. Find the anti-derivative $F(x)$ of

$$f(x) = \frac{6}{\sqrt{4 - 4x^2}}.$$

4. Find the anti-derivative $F(x)$ of

$$f(x) = \frac{4}{x\sqrt{x^2 - 1}}.$$

5. Compute the limit

$$L = \lim_{x \rightarrow 2\pi} \frac{x \sin(x) + x^2 - 4\pi^2}{x - 2\pi}.$$