MAT123 Quiz 9

Chandrika Sadanand

For each of the questions below, show ALL of your work, and ALL the steps required to reach the final answer. There will not be full credit for incomplete solutions. Calculators are not permitted. Please give exact values (do not use decimals), and always simplify your answer as much as possible.

1. The Republic is spawning a clone army to destroy the Jedi Order. Their human template is Jango Fett. Initially, there is one clone (Jango Fett), and every subsequent half hour, the number of clones doubles. How many hours will it take for there to be 1000000 members of the clone army?

\[ A = A_0 e^{rt} \]

\[ A = e^{2\ln(2)}t \]

\[ 1000000 = e^{2\ln(2)t} \]

\[ 10^6 = e^{2\ln(2)t} \]

\[ \ln(10^6) = 2\ln(2)t \]

\[ t = \frac{\ln(10^6)}{2\ln(2)} = \frac{\ln(10)}{2 \ln(2)} = 3 \ln(10) \]

2. Graph \( f(x) = \frac{(x+2)(x-2)}{x^2+1} \). Label all asymptotes, intercepts and any other points you used to build your graph.

\( f(x) = \frac{x^2-4}{x^2+1} \)

\( f(-x) = \frac{(-x)^2-4}{(-x)^2+1} = \frac{x^2-4}{x^2+1} = f(x) \Rightarrow y\text{-axis symmetry.} \)

\[ 0 = \frac{x^2-4}{x^2+1} \Rightarrow x^2-4 = 0 \Rightarrow x^2 = 4 \Rightarrow x = \pm 2 \text{ x-int.} \]

\( f(0) = 0 - 4 = -4 \text{ y-int.} \)

\( n = m = 2 \Rightarrow \text{ horiz. asymptote at } y = 1 \)

\( x^2+1 = 0 \Rightarrow x^2 = -1 \text{ no solutions } \Rightarrow \text{ no vert. asymptote.} \)