(1 point each) (No calculators)

(a) \( \log_4 64 = \)

(b) \( \log_9 3^{10} = \)

(c) \( e^{\ln(7x)} = \)

(d) \( e^{7\ln(x)} = \)

(2 points each) Solve for \( x \). (Show your work. No calculators.)

(a) \( \log_2 (x) = 3 \)

(b) \( \log_3 (3x + 7) = 2 \)

(c) \( \log_5 (8) = 3 \)

(d) \( 2 \ln(x) = \ln(4) + \ln(x + 3) \)
(2 points) Sketch the graph of the function $f(x) = \log_2(x - 3)$. (Show your work. No calculators.)

(6 points) A bacteria culture starts with 500 bacteria and the population doubles every 5 hours.

(a) Find an expression for the number of bacteria after $t$ hours. (Show your work. No calculators.)

(b) Find the number of bacteria that will be present after 8 hours. (Show your work. No calculators.)

(c) When will the population reach 5,000 bacteria? (Show your work. No calculators.)