For 1-2, compute the exact value of the function for the given x-value. (NO CALC)

1. $f(x) = -3 \bullet 4^x$, $x = -\dfrac{1}{2}$

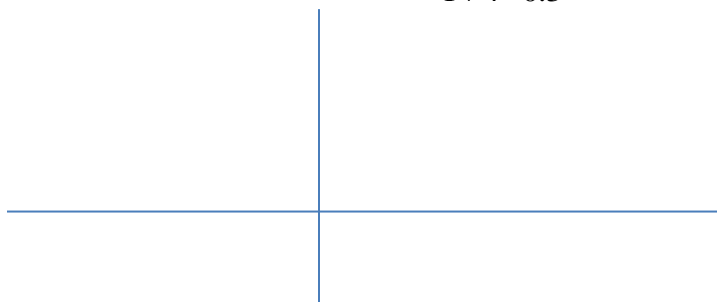2. $f(x) = 6 \bullet 3^x$, $x = \dfrac{3}{2}$

Write the equation of an exponential function that goes through the given points. (CALC OK)

3. (0, 3) and (5, 90)

4. Find the y-intercept and horizontal asymptotes, of the logistic function and sketch a graph

(NO CALC) $f(x) = \dfrac{50}{1 + 4 \bullet 0.3^x}$

5. Find the equation of a logistic function that has an initial value of 18, a limit to growth of 30, and passes through the point (3, 25). (CALC OK)

Numbers 6 and 7 are CALC OK.

6. The population of Elmhurst is 45,000 in the year 2000 and is decreasing by 1.8% each year.

a) Write an equation that models the population as a function of time t in years.

b) What will be the population in the year 2015?

c) Predict when the population will by 20,000.

7. The population P of elk after t years in Blackberry State Park is modeled by the logistic function

$$P(t) = \frac{1200}{1 + 99e^{-0.4t}}$$

a) What was the initial population of elk?

b) When will there be 1000 elk in the park?

c) What is the maximum number of elk that the park can sustain?

8. Evaluate each log expression without using a calculator. (NO CALC)

a) $\log_2 32$

b) $\log_3 \dfrac{1}{81}$

c) $\log \sqrt[3]{10}$

d) $\ln \dfrac{1}{\sqrt{e^3}}$

9. Assuming x and y are positive use properties of logs to expand the logarithm.

a) $\log \dfrac{3+x}{4+y}$

b) $\log_2 x^{-3}$

c) $\ln 1000 x^3$

d) $\log_6 \sqrt{\dfrac{x}{y^4}}$

10. Use properties of logs to write each expression as a single log.

a) $3\log(x+2) - 4\log(x-4)$

b) $3\ln(x-1) + \ln(x+2)$

Solve each of the following (NO CALC!):

11. $2(10^{-3x}) = 200$

12. $16\left(\dfrac{1}{2}\right)^{\frac{x}{4}} = 2$

13. $\log_3 x = -2$

Solve each of the following (CALC OK):

14. $1.06^x = 4.1$

15. $50e^{.035x} = 200$

16. $3 + 2e^{-x} = 6$

17. $\log_4(x-5) = -1$

18. $3\log(x-3) + 4 = 5$

19. $\ln(x-3) + \ln(x+4) = 3\ln 2$