Calculators are allowed; a "cheat sheet" is on the other side

1. Solve for x: $\log_3(x+1) - \log_3(x) = 2$

Strategy: $\log_3(\ ) = \#$, $3^{\log_3(\ )} = 3^{\#}$, $(\ ) = 3^{\#}$

$\log_3\left(\frac{x+1}{x}\right) = 2$

$3^{\log_3\left(\frac{x+1}{x}\right)} = 3^2 = 9$ → $\frac{x+1}{x} = 9$

$x + 1 = 9x$

$1 = 8x$

$x = \frac{1}{8}$

2. **Growth of an Insect Population** The size P of a certain insect population at time t (in days) obeys the function $P(t) = 500e^{0.02t}$.

$A(t) = A(0)\,e^{kt}$

a. What is the population after 0 days (that is, at the beginning)?

$P(0) = 500$ $\quad P(0) = 500e^{0.02*0} = 500e^{0} = 500$

b. What is the population after 10 days?

$P(10) = 500\,e^{0.02*10} = 611$ insects

c. How long will it take for the population to double?

$P(t) = 1000$

$1000 = 500e^{0.02t}$

Strategy: $e^{(\ )} = \#$, $\ln e^{(\ )} = (\ ) = \ln(\#)$

$2 = e^{0.02t}$

$\ln(2) = 0.02t$

$t = \frac{\ln(2)}{0.02} = 34.66$ days