

(1)

BONUS EXERCISE  
EXPONENTIAL WORD PROBLEM  
(POPULATION GROWTH)  
SOLUTIONS  
943 - DW  
FALL 2011

THE POPULATION OF EARTH HAS A DOUBLING TIME OF 57 YEARS. IN 1982, THE POPULATION WAS 4.368 BILLION. WHAT WILL IT BE IN 2011?

Sol<sup>n</sup>

AN EXPONENTIAL EQUATION HAS THE GENERAL FORM:

$$P = P_0 e^{kt}$$

DOUBLING TIME OF 57 YEARS MEANS:

$$\text{WHEN } t = 57 \quad P = 2P_0$$

$$\text{SO} \quad 2P_0 = P_0 e^{57k}$$

$$2 = e^{57k}$$

$$\ln 2 = \ln e^{57k}$$

$$\ln 2 = 57k$$

$$k = \frac{\ln 2}{57}$$

NOW WE CALCULATE  $P$  WHEN  $t$  REPRESENTS THE YEAR 2011.

$$2011 - 1982 = 29 \text{ yrs}$$

$$\text{SO} \quad P = 4.368 e^{\frac{\ln 2}{57}(29)}$$

$$\approx 6.186$$

IN 2011; THE POPULATION WILL BE APPROX 6.186 BILLION

