

NATURAL LOGS

- WE HAVE DONE EXPONENTIAL GROWTH AND DECAY USING LOGS BUT IN REALITY, FOR EXAMPLES, THE POPULATION GROWTH OF A CITY DOES NOT OCCUR AT THE END OF THE YEAR BUT CONTINUOUSLY THROUGHOUT THE YEAR. SO WE USE e^x AND NATURAL LOG (\ln) IN 1981 VANCOUVER HAD A POPULATION OF 1,380,000 GROWING 1.7% PER YEAR (CONTINUOUSLY).

WHAT IS THE Pop. IN 30 YEARS? How LONG UNTIL IT REACHES 4 MILLION?

SOLN

TREASURY

$$A = P(1+i)^t$$

NOW

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



INTEREST RATE

$$A) \quad A = 1.38 e^{(0.17)(30)}$$

$$A = 1.38 e^{.51}$$

$$A = 2.298 \text{ MILLION}$$

3)

$$4 = 1.34 e^{.017t}$$
$$\frac{4}{1.34} = \sqrt[1.34]{1.34}$$

$$2.8986 = e^{.017t}$$

$$\ln 2.8986 = \ln e^{.017t}$$

$$\ln 2.8986 = .017t$$
$$\frac{\ln 2.8986}{.017} = \frac{.017t}{.017}$$

$$62.6 \text{ YEARS} = t$$

H/W Pg 141 # 1-3, 5-7, 9