

Rates of Change in Exponential & Logarithmic Functions

$$\text{Average Rate of Change} \Rightarrow m_{\text{secant}} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

$$\text{Estimate of Instantaneous Rate of Change} \Rightarrow m_{\text{secant}} = \frac{f(a+h) - f(a)}{h}$$

Assigned Work:

p.507 # 4, 7, 11abc
c

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$$4. (a) \quad A = 6000(1 + 0.075)^n$$

(c) semi-annual

$$A(n) = 6000 \left(1 + \frac{0.075}{2}\right)^n$$

$$\text{iRoC (at 10 yrs)} = \frac{A(20+0.01) - A(20)}{0.01}$$

$$\Rightarrow 20 \text{ compounding periods} = \underline{\hspace{2cm}}$$

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t	m
1	0.0002
4	0.0500
8	1.1500
12	5.0700
16	15.9800
20	30.2100

$\frac{\Delta y_2}{\Delta y_1}$
 1.1
 3.92
 10.91
 14.23

* for most biological growth, asymptote at $y=0$

$$m(t) = m_0 b^{\frac{t}{4}} + q$$

$b_1 = \frac{3.92}{1.1} \approx 3.56$
 $b_2 = \frac{10.91}{3.92} \approx 2.78$
 $b_3 = \frac{14.23}{10.91} \approx 1.30$

$b_{avg} \approx 2.55$

$$m(t) = m_0 (2.55)^{\frac{t}{4}}$$

$$= m_0 \left[(2.55)^{\frac{1}{4}} \right]^t$$

$$= m_0 (1.26)^t$$

$$y = ab^{\frac{x}{\Delta x}} + q$$

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$$11(b) \quad S(d) = 93 \log d + 65$$

$$\begin{aligned}
 \text{avg RoC} &= \frac{S(100) - S(10)}{100 - 10} \\
 &= \frac{(93 \log 100 + 65) - (93 \log 10 + 65)}{90} \\
 &= \frac{93(2) - 93(1)}{90} \\
 &\approx 1.03
 \end{aligned}$$

$$\begin{aligned}
 (c) \quad iRoC_{d=10} &= \frac{S(10.001) - S(10)}{0.001} \\
 &= \underline{\hspace{2cm}}
 \end{aligned}$$

$$\begin{aligned}
 iRoC_{d=100} &= \frac{S(100.001) - S(100)}{0.001}
 \end{aligned}$$

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