

MAT150 College Algebra – Solutions to Class Handouts

Sections 3.1 – 3.2

1.

	Function	Vertical Intercept	Growth or Decay?	Rate (as a percent)
a.	$f(x) = 24(1.32)^x$	(0, 24)	Growth	32%
b.	$f(x) = 3324(0.92)^x$	(0, 3324)	Decay	8%
c.	$f(x) = (1.04)^x$	(0, 1)	Growth	4%
d.	$f(x) = 231(0.9)^x$	(0, 231)	Decay	10%
e.	$f(x) = 520(1.16)^x$	(0, 530)	Growth	16%

2. $f(x) = 52 - 11x$ $g(x) = 128(0.5)^x$ $h(x) = 1000(1.1)^x$

3. 3^x _ C _ 2^x _ D _ 0.3^x _ A _ 0.2^x _ B _

4. a. $P(t) = 5311 - 105t$ b. $P(t) = 5311(0.98)^t$

c. $P(t) = 5311 + 307t$ d. $P(t) = 5311(1.06)^t$

5. a. $P(t) = 30000 + \frac{140000}{23}t$ The population grows by 6087 people per year.

b. $P(t) = 30000(1.0783)^t$ The population grows by 7.83% per year.

6. a. $f(x) = 2x + 3$ b. $f(x) = 4.633(1.229)^x$

Section 3.3

1. a. $y = 2.5649(1.1096)^x$ b. $y = 0.7943x + 1.1361$

c. Each person's yearly consumption of bottled water increases by about 0.8 gallons per year. (Linear)

c. Each person's yearly consumption of bottled water increases by about 10.96% per year. (Exponential)

d. Exponential

e. $x=23.75 \rightarrow 2003$

f. $x=19.74 \rightarrow 1999$

g. About 24 bottles per person per year.

h. About 52 bottles per person per year.

Sections 3.4 – 3.5

1.

Function $f(x)=ab^x$	Vertical Intercept	Growth or Decay	Continuous? Yes, No	Rate (as a percent)
$f(x) = 5(1.052)^x$	(0,5)	Growth	No	5.2%
$f(x) = 34(0.68)^x$	(0,34)	Decay	No	68%
$f(x) = 255(0.99)^x$	(0,255)	Decay	No	1%
$f(x) = 52e^{.23x}$	(0,52)	Growth	Yes	23%
$f(x) = 653e^{-.73x}$	(0,653)	Decay	Yes	73%
$f(x) = e^{-.034x}$	(0,1)	Decay	Yes	3.4%
$f(x) = 20e^{.053x}$	(0, 20)	Growth	Yes	5.3%
$f(x) = 100(.88)^x$	(0, 100)	Decay	No	12%
$f(x) = 5e^{-.12x}$	(0, 5)	Decay	Yes	12%
$f(x) = 11(1.0123)^x$	(0, 11)	Growth	No	1.23%

2. a. $A(t) = 200e^{-0.14t}$ b. $A(2) = 151.16\text{mg}$ c. $x=4.951$. Just before 1:00pm

3. a. $B(t) = 10000\left(1 + \frac{.06}{12}\right)^{12t} \approx 10000(1.06168)^t$ b. $B(3) = \$11966.81$

c. 11.58 years d. 6.168%

4. a. $B(t) = 10000e^{0.06t} \approx 10000(1.06184)^t$ b. $B(3) = \$11972.17$

c. 11.55 years d. 6.184%

Sections 4.1 – 4.2

1. a. $7^3 = 343$ b. $e^3 = x$ c. $10^y = x$

2. a. $\log_3(9) = 2$ b. $\ln(P) = 2t$ c. $\log_{36}(6) = \frac{1}{2}$

3. a. $\log_5(37) = \frac{\log(37)}{\log(5)} \approx 2.244$ b. $\log_{\frac{1}{2}}(108) = \frac{\log(108)}{\log(1/2)} \approx -6.755$

4. a. True

b. False, $\log\left(\frac{x}{yz}\right) = \log(x) - (\log(y) + \log(z)) = \log(x) - \log(y) - \log(z)$

c. True d. True e. False, $\log(xy^2) = \log(x) + 2\log(y)$

f. False g. False, $\log(a) - \log(b) = \log\left(\frac{a}{b}\right)$ g. True

5.

$f(x)=ab^x$	$f(x)=ae^{kx}$	Initial Value	Annual Rate	Continuous Rate
$f(x) = 56(1.105)^x$	$f(x) = 56e^{.1x}$	56	10.5%	10%
$f(x) = 77(0.905)^x$	$f(x) = 77e^{-.1x}$	77	9.5%	10%
$f(x) = 59(1.07)^x$	$f(x) = 59e^{.0677x}$	59	7%	6.77%
$f(x) = 67(.72)^x$	$f(x) = 67e^{-.3285x}$	67	18%	32.85%

6. a. $x = \log_{1.08}(1.2) = \frac{\log(1.2)}{\log(1.08)} \approx 2.369$ b. $x = \frac{\ln(0.5)}{-0.14} \approx 4.951$

Section 4.3

1. a. $x = 177142$ b. $x = \frac{e^6 - 1}{2} \approx 202.2144$ c. $x = \frac{10^{-3}}{3} \approx 0.0003$

2.

Function	Domain	Range	Graph
$f(x)=\log(x-7)$	$x > 7$	All real numbers	
$g(x)=\log(7-x)$	$x < 7$	All real numbers	
$h(x)=2e^{-2x}$	All real numbers	$h(x) > 0$	
$k(x)= 2^x + 5$	All real numbers	$k(x) > 5$	

3. a. Top to bottom: A, B, G, A b. $(0, 20)$ c. $y = 0$

d. $x = \log_{0.45}(0.5) = \frac{\log(0.5)}{\log(0.45)} \approx 0.868$

4. a. Top to bottom: B, A, C, D b. $(1, 0)$ c. Increasing

d. $x = 3$ e. $g(5) = \log_3(5) = \frac{\log(5)}{\log(3)} \approx 1.465$ f. $g(9) = 2$ g. $x = 59049$