

University of South Carolina
Math 111: College Algebra
Instructor: Austin Mohr
Section 8
Fall 2008

Test 3
(200 points total)

- [24] 1. Complete the following statements.
- a. The function $f(t) = Ca^t$ represents growth when
 - b. The function $f(t) = Ca^t$ represents decay when
 - c. The function $f(t) = Ce^{kt}$ represents growth when
 - d. The function $f(t) = Ce^{kt}$ represents decay when
 - e. When the y-value of the graph of $\log(x)$ is increased by 1, the x-value is
 - f. When the y-value of the graph of $\ln(x)$ is increased by 1, the x-value is

- [20] 2. Contract $\frac{\frac{1}{3}\log(w+2)+\log(x)}{4\log(y)-2\log(y)}$ as much as possible.

- [23] 3. Solve for x if $\log(x) - \log(x + 3) = 2$.

[32] 4. The growth of a population of 10 bacteria can be modeled by $p(T) = 25 \cdot 4^T$ where T is measured in 20-second intervals.

a. How many bacteria are present after 4 minutes?

b. How many 20-second intervals are required for the population to grow to 500 bacteria?

c. Rewrite $p(T)$ in the form $p(T) = Ce^{kT}$.

d. Using the original function $p(T) = 25 \cdot 4^T$, construct a new function of the form $p(t) = Ca^t$ where t is measured in 1-second intervals.

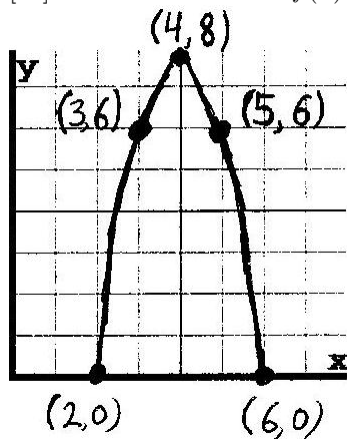
[27] 5. A savings account has a 6% annual interest rate and is compounded continuously.

a. Construct a function $f(t)$ to model the growth of an arbitrary initial investment P_0 where t is measured in 1-year intervals.

b. What is the doubling time for an investment in this account? (Hint: This value depends only on the annual interest rate, not the amount invested.)

c. What is the effective annual interest rate for this account? (Hint: This value depends only on the annual interest rate, not the amount invested.)

[23] 6. Write a function $f(x)$ in vertex form for the following parabola.



[24] 7. Factor each expression and find the roots of the function.

a. $f(x) = 5x^2 + 2x$

b. $g(x) = x^2 - 25$

c. $h(x) = 3x^2 + 9x + 6$

[27] 8. Suppose the height (in feet) of a baseball t seconds after being thrown is given by $h(t) = 5 + 50t - 12t^2$.

a. What is the height of the baseball the moment it is released?

b. At what time does the baseball attain maximum height? What is the maximum height?

c. When does the baseball hit the ground?