

## Algebra II Review Sheet for Exam VII

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The exam will cover the material from sections 8.1 through 8.6 and sections 9.1 and 9.2. A thorough understanding of these problems should put you in good shape for the exam. A word to the wise: Try to do these problems without a calculator.

**Warning:** These problems should not be completed in lieu of your “regular” study methods. In particular, you should still review your notes, past quizzes and homework problems (heed ALL comments!) and, of course, the relevant material in your book. Additionally if you are uncomfortable with any previously covered concept, you should go back and review those ideas.

### 1. CHAPTER 8

- (1) Using transformations, graph the following functions, carefully labeling easy points and the asymptotes. Determine which functions are growth functions and which are decay functions. Then algebraically find the inverse of each function.

(a)

$$f(x) = \frac{1}{2}(4^x)$$

(b)

$$g(x) = 3^{x-1} + 2$$

(c)

$$h(x) = 6 \left(\frac{2}{3}\right)^{x+2} - 1$$

(d)

$$a(x) = -2e^{2x} + 4$$

(e)

$$m(t) = 4e^{-t} - 4$$

(f)

$$s(t) = -\left(\frac{3}{4}\right)^{-t} - 8$$

(g)

$$b(t) = 2^{3t+4} - 5$$

- (2) Suppose you purchase a car for \$50000. Each year, the value of the car depreciates by 2%. How much will your car be worth after 5 years?

- (3) The student government is trying its best to stop the spread of a certain rumor. The day the rumor started, only two people knew of the rumor. According to the government's predictions, the rumor seems to be growing continuously at the rate of 10% (per day). If the government is ineffective in its efforts to stop the rumor,
- how many people would have heard the rumor
    - after 10 days?
    - after 30 days?
  - how long would it take until the entire school population of 500 students would have heard the rumor?
- (4) Suppose you deposit \$2000 into a bank account that pays an APR of 4.5% in interest. How much money will you have after 3 years if the interest is compounded
- semi-annually?
  - continuously?
  - bi-monthly?
  - quarterly?
  - monthly for the first year, bi-weekly for the second and continuously for the third?
- (5) Simplify the following expressions
- $$4e^{-3} \cdot e^5$$
  - $$\sqrt{2e^{2x}}$$
  - $$\frac{12e^x}{e^{3x}}$$
  - $$\sqrt[3]{8e^{12x}}$$
  - $$7^{\log_7(x)}$$
  - $$\log_3(3^{3x})$$
- (6) (a) 
$$\log_7 \sqrt[4]{49a}$$
- (b) 
$$\log_7 \left( \frac{b^3}{a} \right)$$
- (7) Simplify the following expressions
- $\log_2 4$
  - $\log_7 1$
  - $\log_3 27$
  - $\log_8 2$

- (e)  $\log_1 00\left(\frac{1}{1000}\right)$
- (f)  $\log 100 + \log 10000$
- (g)  $\log_5 625^x$
- (h)  $\log 3 + \log 5$
- (i)  $\log_3(x + 5) + \log_3(4)$
- (j)  $2 \ln x - 3$
- (k)

$$2 \log_2 x - \log_2(x + 1) + \log_2 3$$

(l)

$$3[\ln(x - 2) + 2 \ln(x + 1) - \ln(x + 2) - 5 \ln(x - 1)]$$

(8) Expand the following expressions

(a)

$$\log_6 \frac{3x}{y}$$

(b)

$$\log_3 \sqrt{xyz}$$

(c)

$$\log_2 \frac{(xy)^4}{z^2}$$

(9) Simplify the expression

$$a^{[\log_a(x) + \log_A(x)]}$$

Where  $a$  and  $x$  are positive real numbers and  $A = a^2$ 

(10) Graph the following functions, stating their respective domains and ranges. Then algebraically find the inverse of each function.

(a)  $a(x) = 4(x - 3)^{1/3} + 5$

(b)  $b(x) = \frac{1}{2}(x - 2)^{1/3} + 2$

(c)  $c(x) = (x - 7)^{1/2} - 2$

(d)  $m(x) = 2(3x - 1)^{1/2} + 1$

(e)  $s(x) = 3(2x - 3)^{1/3} + 4$

(11) Find the exact value of  $x$  for each of the following expressions:

(a)  $\log_2(-x - 3) - \log_2(x - 1) - \log_2(x + 3) = 1$

(b)  $\log(2x + 1) = 1$

(c)  $\ln(x^2 - 1) = \ln(x + 5)$

(d)  $\log(3x + 2) = \log(2x - 1)$

(e)  $(\ln x)^2 = 2 \ln x$

(f)  $\log_4(x + 1) = \log_2(2x - 3)$  *(hint: Using a change of base would be helpful here)*

## 2. CHAPTER 9

- (1) (a)
- (b)
- (c)
- (2)
- (3)
- (4)