

Intermediate Algebra

Semester 2 Final Review Part 2

- Exponentials/Logarithms
 - Basic exponentials review
 - Compound interest and other word problems
 - Calculating and graphing logarithms
 - Rules of logs/solving equations with logs
- Counting/Probability
 - Counting Principle
 - Permutations/Combinations
 - Probability (at end)
- Sequences/Series
 - Arithmetic/geometric sequences
 - Arithmetic/geometric series
 - Random series

Homework

Tuesday: 3 sections

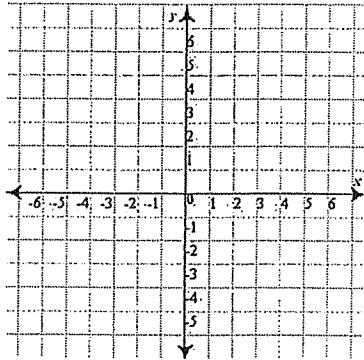
Wednesday: 3 sections

All 10 sections complete will
be worth 2 extra credit
homework assignments

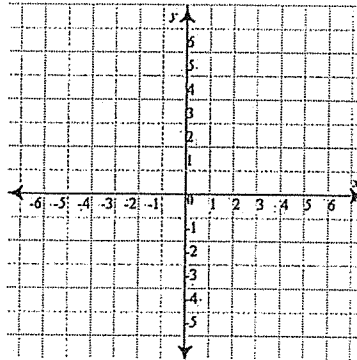
Basic Exponentials Review

Graph each exponential and state the domain, range, and equation of the asymptote.

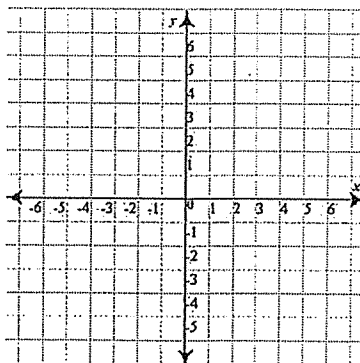
1. $f(x) = \frac{1}{2} \cdot 3^x$



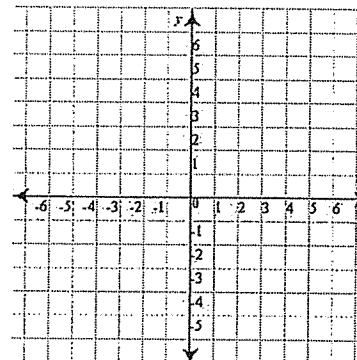
2. $y = -\left(\frac{1}{2}\right)^x$



3. $f(x) = 2^{-x} - 6$



4. $f(x) = \left(\frac{2}{3}\right)^{x+3} + 1$



Solve each exponential equation.

5. $2^x = 4^{x-1}$

6. $5^{x+2} = \left(\frac{1}{5}\right)^x$

7. $3 \cdot 9^x = \left(\frac{1}{27}\right)^x$

Compound Interest and Other Word Problems

Suppose you invest \$1,000 in the four savings accounts described below. How much money would be in each account after 11 years?

1. Bank of America pays 5% compounded annually.

2. Chase pays 4% compounded quarterly.

3. Wells Fargo pays 5% compounded continuously.

4. U.S. Bank pays 4% compounded daily.

5. On January 1st there are three people diagnosed with a mysterious disease. How many infected individuals will there be by the end of December if the number of cases doubles each month?

6. Niobium-13 has a half-life of 23 days. How much of a 5 gram sample of niobium-13 will still be radioactive after 60 days?

7. The radioactive element thorium-104 has a half-life of 13 years. A forensic detective has just found a bone belonging to a homicide victim that contains 10 grams of thorium-104. If 1.25 grams of the 10 grams of thorium-104 is still radioactive, how long ago did the victim die?

Calculating and Graphing Logarithms

Calculate.

1. $\log_3 \frac{1}{9}$

2. $\log_2 1$

3. $\log_{100} 10$

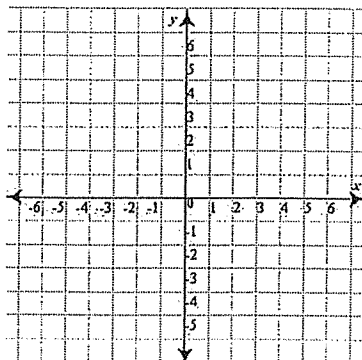
4. $\log_3 81$

5. $\log_4 \frac{1}{2}$

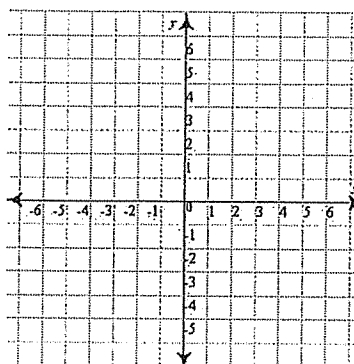
6. $\log_7 \sqrt[5]{7}$

Graph each logarithm and state the domain, range, and equation of the asymptote.

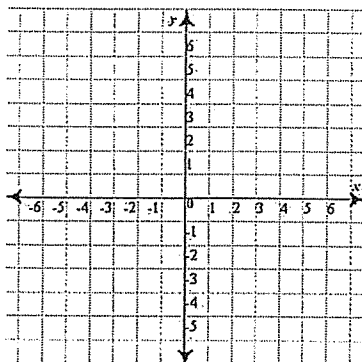
1. $f(x) = \log_2 x$



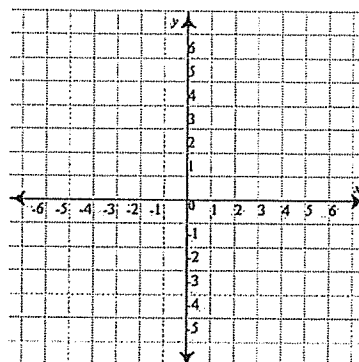
2. $f(x) = \log_{\frac{1}{2}} x$



3. $f(x) = 2 \log_3 x$



4. $f(x) = 1 + \log_{\frac{1}{3}}(x + 4)$



Rules of Logs/Solving Equations with Logs

Condense each expression into one logarithm.

1. $\log 3 + \log(1 + x)$

2. $4 \log_{\pi} a - 3 \log_{\pi} b$

Expand each expression.

3. $\log_3 \left(\frac{6}{x} \right)$

4. $\log(a^2 b)^4$

Solve each equation for x .

5. $1 = \log_5(2x + 3)$

6. $\log_x 9 = \frac{2}{3}$

7. $-\ln(4x) = \ln\left(\frac{1}{2}\right)$

8. $\log_2(x - 1) + \log_2(x - 3) = 3$

Counting Principle

1. You go to the cafeteria for lunch and have a choice of 4 entrees, 5 sides, 5 drinks, and 4 desserts. Assuming you have one of each category, how many different lunches could be made?
2. You go to the home electronics store to buy a new television. You have the following choices: lcd, dlp, crt, or plasma; full screen or wide screen; 13", 19", 27", 32", 36", 41", 51", or 63". How many different televisions does the store have to offer?
3. You toss a penny 4 times. How many different outcomes are there?

Calculate your answers to the following two questions without using our formula for permutations.

4. How many different arrangements are there of the letters in the word FINALS?
5. How many different arrangements are there of the letters in the word HAPPY?
6. There are 8 students preparing to line up at the door – 4 girls and 4 boys. How many ways can they line up if the first in line must be a boy, the second must be a girl, and the last must be a boy?

Permutations and Combinations

Calculate.

1. ${}_5C_2$

2. ${}_4P_4$

3. ${}_4C_4$

4. ${}_{10}P_3$

5. ${}_{10}C_3$

6. ${}_3P_6$

Simplify.

12. $\frac{(n+1)!}{n^2+n}$

13. $(n-2)!(n^2-n)$

14. a) At a math department meet and greet there are 12 new staff members. If everyone shakes everyone else's hand exactly once, how many handshakes will there be all together?

b) In how many different orders could the 12 new staff members be introduced?

Arithmetic/Geometric Sequences

Find the formula for the n^{th} term of the sequence, then use your formula to calculate the 10th term.

1. 6, 15, 24, 33, ...

2. 768, 384, 192, 96, ...

3. -5, -1, 3, 7, ...

4. $\frac{2}{9}, \frac{2}{3}, 2, 6, \dots$

5. $a_2 = 5, d = -1$

6. $a_3 = 2, a_5 = 6, a_7 = 10$

7. $a_1 = 3, r = \frac{4}{3}$

8. $a_2 = 4, r = 2$

Arithmetic/Geometric Series

1. $\sum_{k=1}^8 3(2)^k$

2. $\sum_{k=2}^{24} (k + 3)$

3. $\sum_{k=1}^{30} 2k$

4. $\sum_{k=-10}^{-1} \left(\frac{3}{2}k - 3\right)$

4. $\sum_{k=0}^{\infty} 7\left(\frac{1}{2}\right)^n$

6. $\sum_{k=3}^9 \frac{1}{8}(2)^3$

Random Series

1. $\sum_{k=1}^{13} (k^2 - 3k)$

2. $\sum_{k=-1}^4 (k^3 - 3)$

3. $\sum_{k=1}^4 \frac{2}{k}$

4. $\sum_{k=1}^{15} (k-6)(k+1)$

Rewrite each sum using sigma notation.

5. $11 + 13 + 15 + 17 + 19$

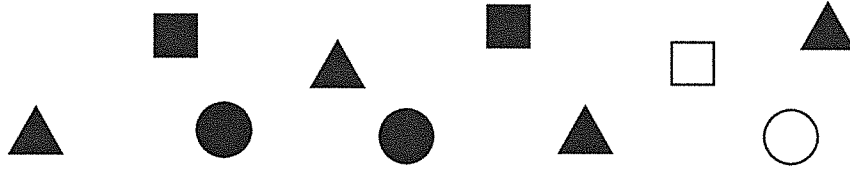
6. $8 + 4 + 2 + 1 + 0.5$

7. $0 + 4 + 16 + 36 + 64 + 100 + 144$

8. $1 - 3 + 9 - 27 + 81 - 243$

Probability

For each question, you will be reaching into a bag and choosing randomly from the following selection of shapes. Calculate each probability and write your answer as a reduced fraction.



1. You select one shape at random. What is the probability that it is...

a) Not a circle?

b) Black or a square?

c) A triangle, circle, or square?

d) Black given that it is a triangle?

2. You select one shape at random, set it aside, then select a second shape at random. What is the probability that...

a) The first shape is black and the second shape is white?

b) Both shapes are white circles?

c) The first shape is a triangle and the second shape is black?

d) Neither shape is a black?

3. You select one shape at random, put it back into the bag, then select a second shape at random. What is the probability that...

a) The first shape is black and the second shape is white?

b) Both shapes are white circles?

c) The first shape is a triangle and the second shape is black?

d) Neither shape is a black?