Write your name on the appropriate line on the exam cover sheet. This exam contains 9 pages (including this cover page) and 10 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work. If you run out of room for an answer, continue on the back of the page — being sure to indicate the problem number.
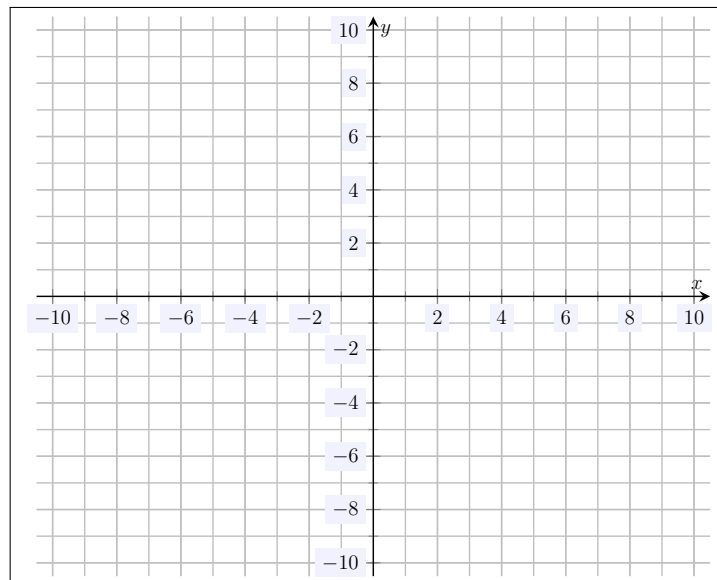
Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
Total:	100	

1. (10 points) Consider the exponential function $y = 3(2^{1-x})$.

   (a) Write this exponential function in the form $y = Ab^x$.

   (b) What is the y-intercept of this function?

   (c) Sketch this function below.

2. (10 points) Consider the exponential function $f(x) = 14.2(1.3)^x$.

(a) What is the 'initial value' for $f(x)$?

(b) Is $f(x)$ growing exponentially or decaying exponentially ? Explain.

(c) Determine the growth or decay rate for $f(x)$.

3. (10 points) Explain why the function given in the table below is *not* linear.

x	1	2	3	4
$f(x)$	5	2.5	1.25	0.625

Also, determine if the function given in the table below is exponential or not. Be sure to fully justify your response.

4. (10 points) Determine the domain *and* range of the functions given below.

   (a) $f(x) = 4e^{0.1x}$

   (b) $g(x) = \ln(x + 5)$

5. (10 points) Phosphorus-32 is an isotope used in botany to track the uptake of fertilizers through plant roots to the leaves of the plant. It has a half-life of 14.3 days. Suppose you have 16.2 g of Phosphorus-32 for use in experiments.

   (a) Find a function, $A(t)$, that gives the amount of Phosphorus-32 that you have left after t days.

   (b) How much Phosphorus-32 do you have left after 20 days?

   (c) How long until you have only 1 g of Phosphorus-32 remaining?

6. (10 points) Compute the following:

(a) $\log_{12}(1) =$

(b) $\log_5\left(\dfrac{1}{25}\right) =$

(c) $\log_9(9) =$

(d) $\log_2(32) =$

(e) $\ln(e^{15}) =$

7. (10 points) Use change of base to compute $\log_5(13)$.

8. (10 points) Rewrite the following 'logarithmic equations' in terms of an 'exponential equation':

   (a) $\log_6(216) = 3$

   (b) $\log_3\left(\dfrac{1}{81}\right) = -4$

9. (10 points) Rewrite the following 'exponential equations' in terms of a logarithmic equation:

   (a) $8^{1/3} = 2$

   (b) $7^5 = 16807$

10. (10 points) You take out a loan for $6,000 that has an annual interest rate of 8.3%, compounded continuously.

    (a) How much do you owe after 2 years?

    (b) How long until the amount you owe is $10,000?