

**Exam #4**

December 7, 2017

Name \_\_\_\_\_

- You will be told when to begin the work and when to terminate work on the examination. You must stop when instructed. Points may be deducted in case of violations.
- Please show your work to support your answers that require calculations. Correct but unsupported answers may not be given full credit.
- The use of a cell phone or other electronic communication devices during the examination is not allowed. The exam will be canceled and a grade of “0” will be assigned to anyone who uses a cell phone during the examination or if one is found within hands reach.
- Calculators are not allowed on this exam.
- The exam consists of two parts. Part I contains four multiple choice questions worth 5 points each if not stated otherwise. Part II contains six open ended questions worth 9 points each if not stated otherwise.

**Honor Code:** *On my honor, I have neither received nor given any aid during this examination.*

Signature: \_\_\_\_\_

## Part I

Choose your answer from five available choices. No partial credit will be given for wrong answers.

1. Find  $f(g(x))$  if  $f(x) = \sqrt{3x-1}$  and  $g(x) = x^2 - x$

- (a)  $\sqrt{3x^2 - x - 1}$
- (b)  $\sqrt{3(x^2 - x) - 1}$
- (c)  $\sqrt{3x-1}^2 - \sqrt{3x-1}$
- (d)  $\sqrt{3x-1}(x^2 - x)$
- (e) None of the above

2. Find the inverse of  $f(x) = \frac{2x-1}{3}$ .

- (a)  $f^{-1}(x) = \frac{3x+1}{2}$
- (b)  $f^{-1}(x) = \frac{2x+1}{x}$
- (c)  $f^{-1}(x) = \frac{2x-1}{3}$
- (d)  $f^{-1}(x) = \frac{3}{2x-1}$
- (e) None of the above

3. The equation  $y = \ln(x)$  is equivalent to which equation?

- (a)  $x = \ln(y)$
- (b)  $y = b^x$
- (c)  $y = e^x$
- (d)  $x = e^y$
- (e) None of the above

4. The expression  $\ln\left(\frac{x^2}{2^8 y^3}\right)$  can be expanded into

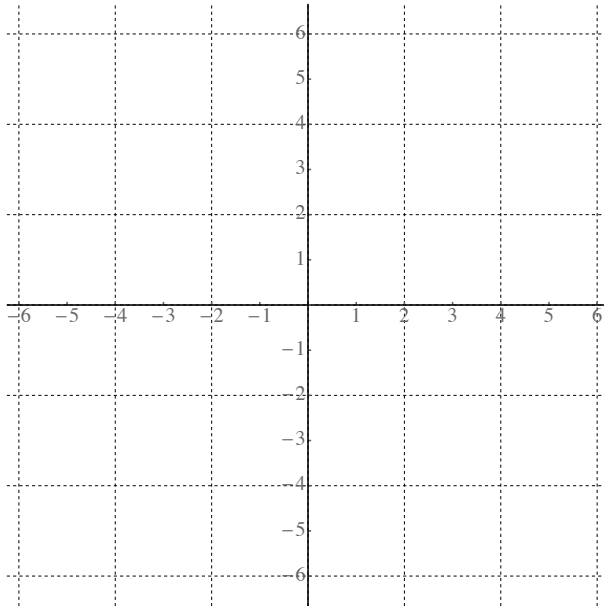
- (a)  $2 \ln x - 8 \cdot 3 \ln 2 + \ln y$
- (b)  $\ln x^2 - 8 \ln 2 + 3 \ln y$
- (c)  $2 \ln x - 8 \ln 2 + 3 \ln y$
- (d)  $2 \ln x - 8 \ln 2 - 3 \ln y$
- (e) None of the above

## Part II

5. Graph  $y = -\frac{1}{2} \cdot 3^{x-3}$  using transformations. Start with the graph of a basic function – **plot accurately at least two points** and use them to perform transformations. Do one transformation at a time. Name the transformation and write the equation of the resulting function.

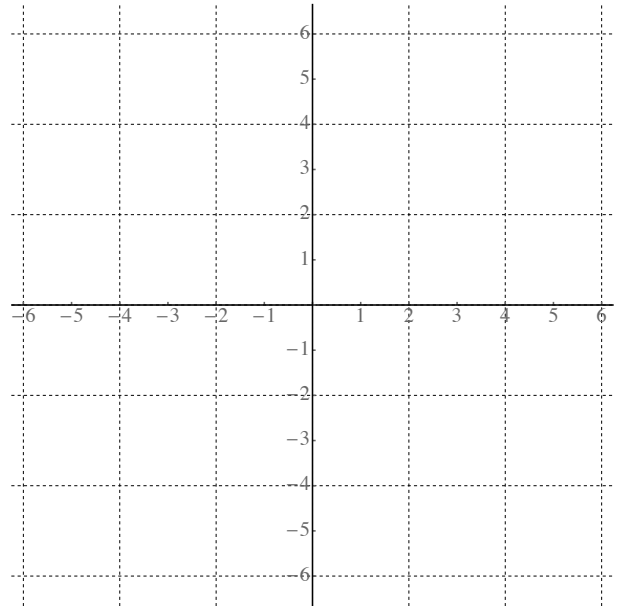
(i) Basic function:

y=



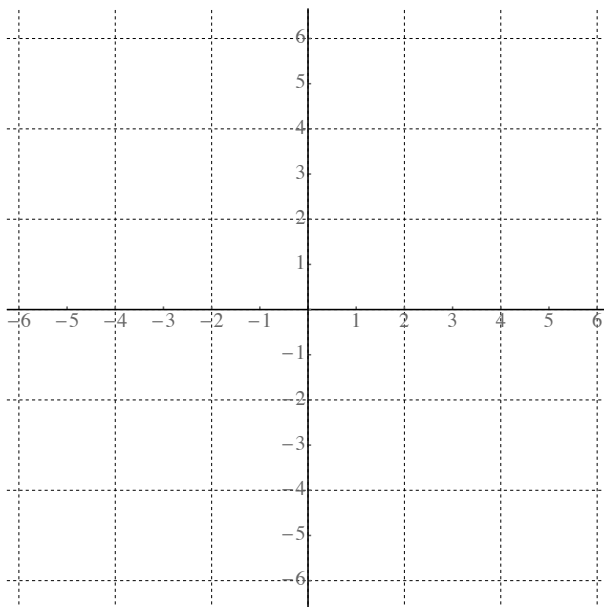
(ii) transformation:

y=



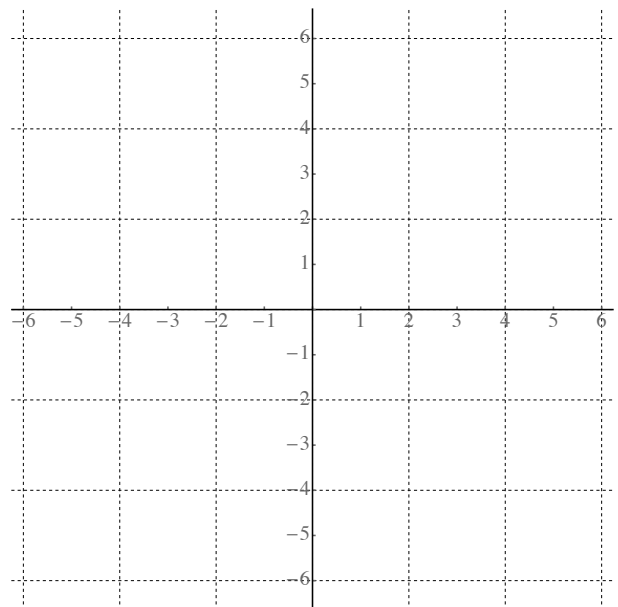
(iii) transformation:

y=



(iv) transformation:

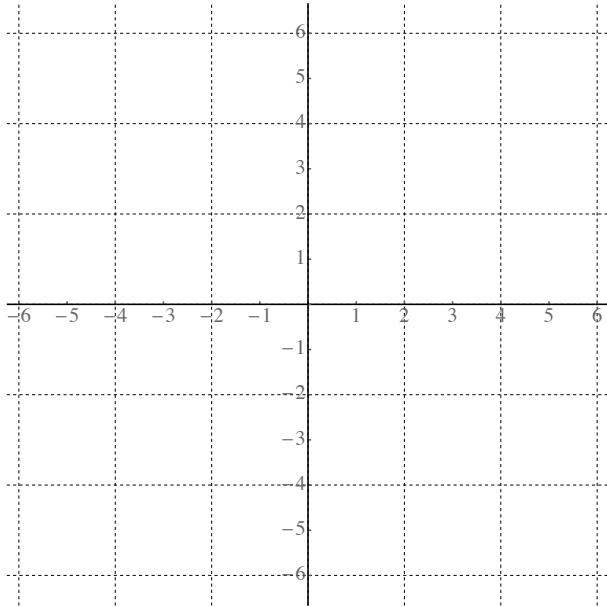
y=



6. Graph  $y = 4 \log_5\left(\frac{x}{2} + 3\right)$  using transformations. Start with the graph of a basic function – **plot accurately as least two points** and use them to perform transformations. Do one transformation at a time. Name the transformation and write the equation of the resulting function.

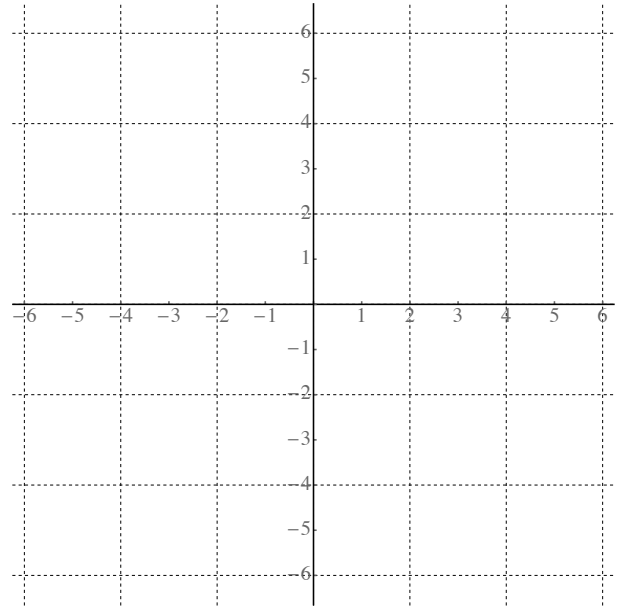
(i) Basic function:

y=



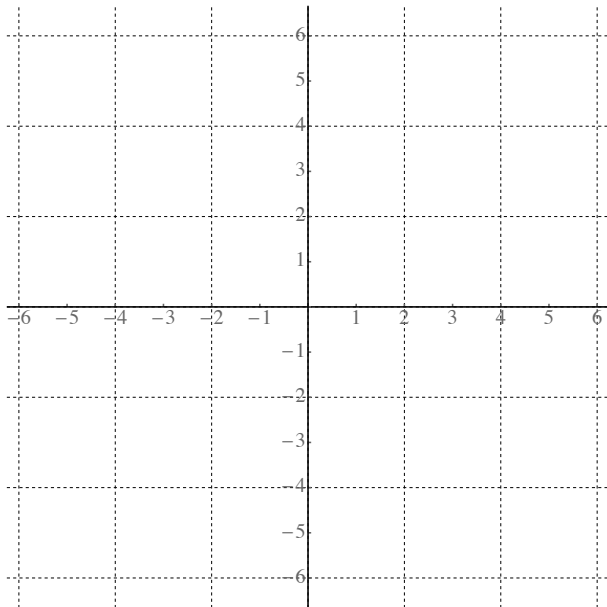
(ii) transformation:

y=



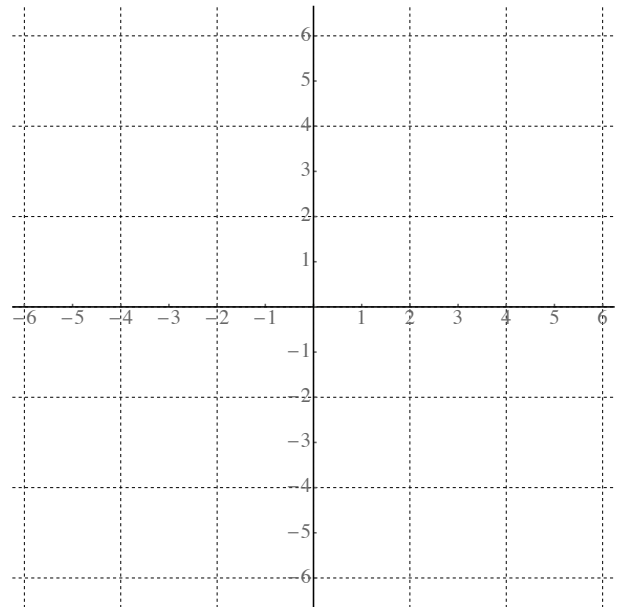
(iii) transformation:

y=



(iv) transformation:

y=



7. Evaluate the following logarithm

$$\log_5(125)$$

8. Rewrite the following expression as one logarithm

$$2 \log_3 x + \log_3 y - 4 \log_3 (x - 1) - 3 \log_3 z$$

9. Use the properties of logarithms to evaluate

$$\log(25) + \log(4) + \log(10)$$

10. (9 pts each) Solve the following equation

(a)

$$5^{x-3} = 25$$

(b)

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

(c)

$$11^{x+1} = 3$$

(d)

$$3^{x^2-20} = 9^{4x}$$

(e)

$$\log_5(x + 23) + \log_5(x - 1) = 2$$