MAC 1140, Spring 2018

Exam #3

March 22, 2018

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 consist of two parts. Part I contains five multiple choice questions worth 4 points each. Part II contains six open ended questions worth 8 points each if not stated otherwise.

Part I

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

1. Which of the following is an exponential function?
   (a) $f(x) = x^3 - \frac{3}{x^2}$
   (b) $f(x) = \log_3(2x - 3)$
   (c) $f(x) = (2x)^{5/3}$
   (d) $f(x) = 3^{2x}$
   (e) None of the above

2. The value of $\log_7(\log_4 4)$ is
   (a) -1
   (b) 1
   (c) 0
   (d) 5
   (e) None of the above

3. The solution of the equation $\log_5 x + \log_5 3 = \log_5 18$ is
   (a) 6
   (b) 18
   (c) -1
   (d) 3
   (e) None of the above

4. The expression $3\log(x) - \frac{1}{2}\log(y) + 3\log(z)$ can be condensed to the following form.
   (a) $\log\left(\frac{3x}{\frac{1}{2}yz^3}\right)$
   (b) $\frac{\log x^3}{\log(\sqrt{y}z^3)}$
   (c) $\log\left(\frac{x^3z^3}{\sqrt{y}}\right)$
   (d) $\log\left(\frac{x^2}{\sqrt{y}z^3}\right)$
   (e) None of the above

5. The foci of the ellipse $\frac{(x+3)^2}{16} + \frac{y^2}{36} = 1$ are
   (a) $(-3 \pm 2\sqrt{5}, 0)$
   (b) $(-3, \pm 2\sqrt{5})$
   (c) $(3 \pm 2\sqrt{5}, 0)$
   (d) $(3, \pm 2\sqrt{5})$
   (e) None of the above

Part II

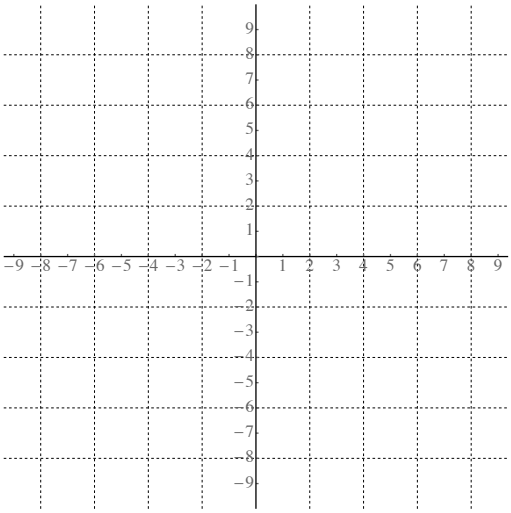
6. Let $f(x) = \log_2(-x + 3)$

   (a) (4 pts) Find the domain of f. Show your work, and answer alone will get no credit.

   (b) (8 pts) Graph the function using transformations. Start with the graph of a basic function – **plot accurately at least three points** and use them to perform the transformations. Do one transformation at a time. Name the transformation and write the equation of the resulting function. Draw asymptotes, if any.

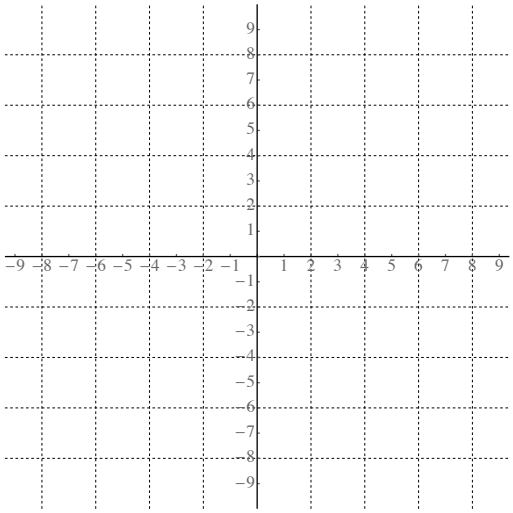
(i) Basic function:

y=



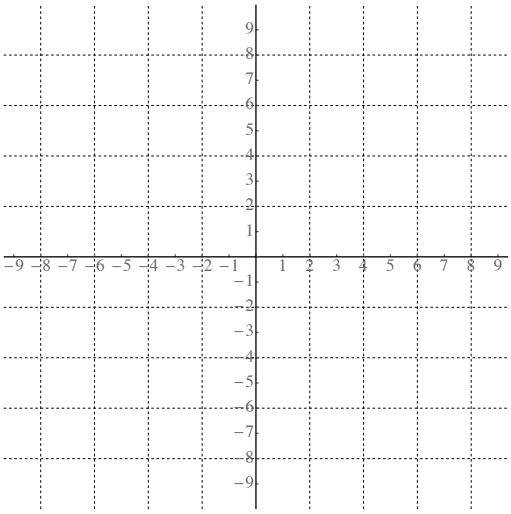
(ii) transformation:

y=



(iii) transformation:

y=



(c) (5 pts) Find the inverse of $f(x) = \log_2(-x + 3)$

7. (8 pts each) Solve the equation.

(a) $3 + e^{2x-1} = 5$

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

(c) $\ln(x + 9) - \ln(2x) = \ln(x + 2)$

(d) $\log_4(x^2 - 4) = 2$

8. Write as the sum and/or difference of logarithms. Express powers as factors.

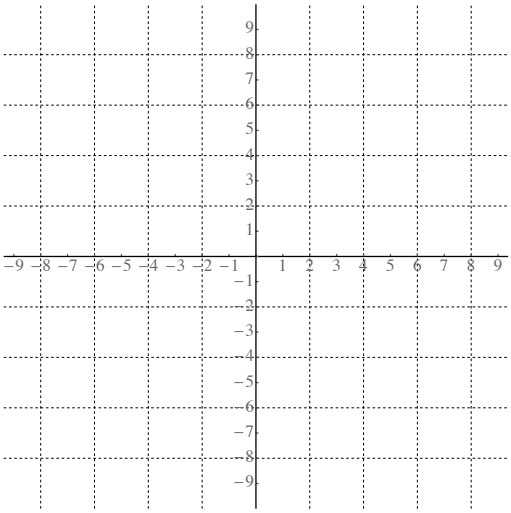
$$\ln\left(\frac{(x-2)^5(x+1)^3}{x^3}\right)$$

9. If $f(x) = \log_6 x$ and $g(x) = \log_6(x+1)$, then what are the solutions of $(f+g)(x) = 1$?

10. Graph $y = e^{x+5} - 3$ using transformations. Start with the graph of a basic function – **plot accurately at least three points** and use them to perform the transformations. Do one transformation at a time. Name the transformation and write the equation of the resulting function. Draw asymptotes, if any.

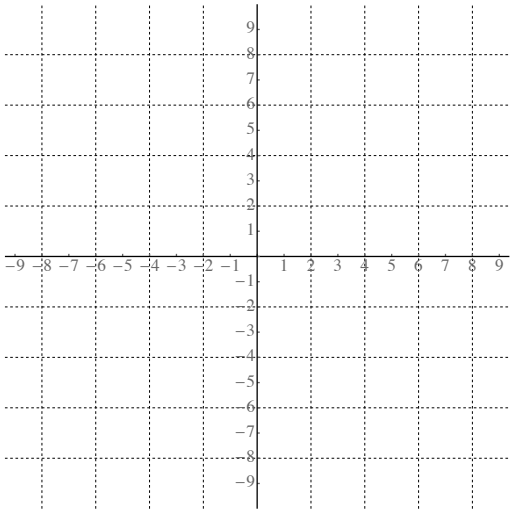
(i) Basic function:

y=



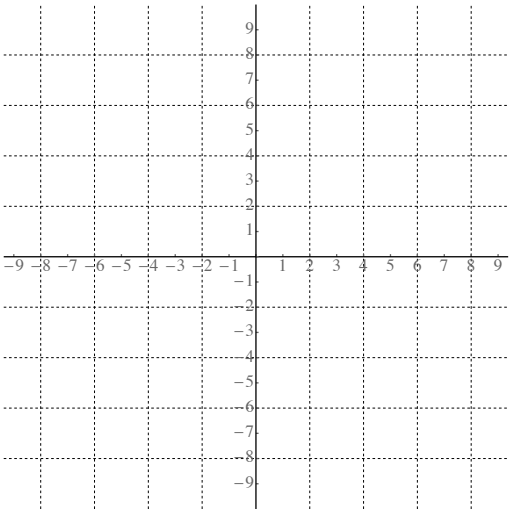
(ii) transformation:

y=



(iii) transformation:

y=



11. Write the standard equation of the ellipse with vertex at $(3, -1)$ and foci at $(1, -1)$ and $(-3, -1)$.

12. (9 pts) Transform the general equation of an ellipse below into its standard form. Graph the ellipse and determine the coordinates of the center, vertices and foci.

$$9x^2 + 16y^2 + 32y - 128 = 0$$

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