Math 110 Exam 3

Fall 2015

All Sections

Instructions:

- DO NOT WRITE on the exam.
- Choose the one choice that best completes the statement or answers the questions.
- Fill in the answer to each problem on your computer-scored answer sheet.
- There is no time limit.
- No books, notes, or calculators allowed.

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1. Let $f(x) = \dfrac{x^2+3}{x-2}$ and $g(x) = \dfrac{x-1}{x}$. What is the domain of $f \circ g$?

   A. $\{x | x \neq 0 \text{ and } x \neq 2\}$

   B. $\{x | x \neq -1 \text{ and } x \neq 2\}$

   C. $\{x | x \neq 0\}$

   D. $\{x | x \neq -1$ **and** $x \neq 0\}$

   E. $\{x | x \neq 2\}$

2. Let $g(x) = \dfrac{x-1}{x}$. What is $g^{-1}(x)$?

   A. $g^{-1}(x) = \dfrac{1}{x-1}$

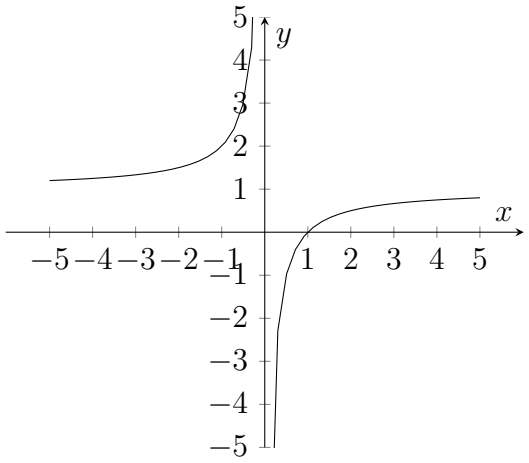
   B. $g^{-1}(x) = \dfrac{1}{1-x}$

   C. $g^{-1}(x) = \dfrac{1}{x+1}$

   D. $g^{-1}(x) = \dfrac{-1}{x+1}$

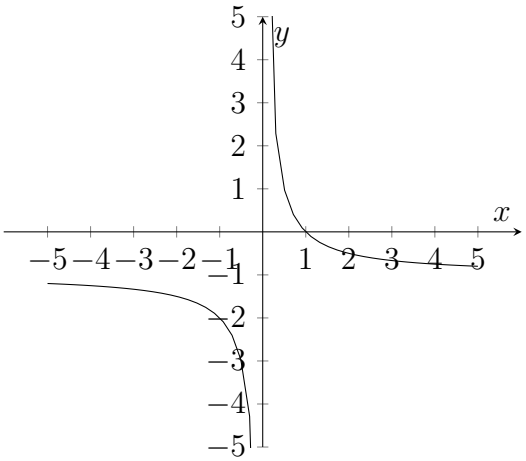
   E. $g^{-1}(x)$ does not exist

3. The graph of $f(x)$ is below:

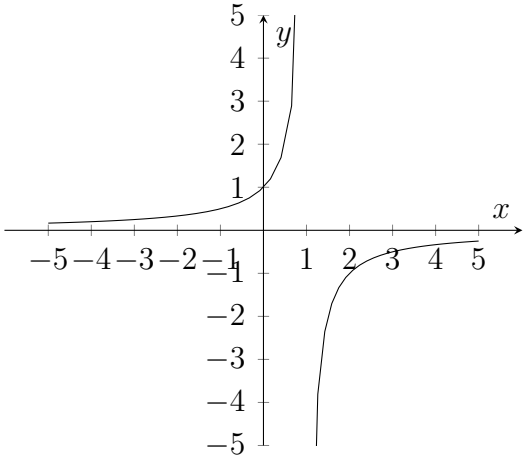


Which of the following graphs is $f^{-1}(x)$?

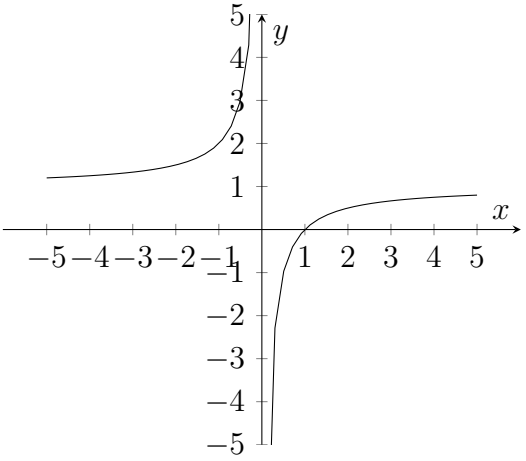
A.



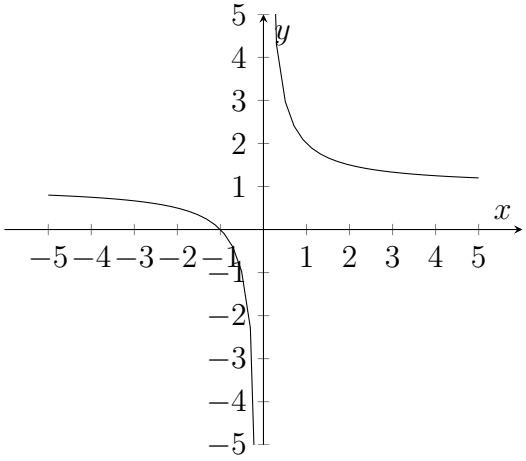
B.



C.



D.



E. $f(x)$ has no inverse

Use the following table of values for $f(x)$ and $g(x)$ to answer questions 4 and 5.

x	f(x)	g(x)
-2	1	-1
-1	8	0
0	-1	1
1	2	2
2	-2	3

4. What is $(f \circ g)(-2)$?

A. -2 B. -1 C. 1 D. 2 **E. 8**

F. Cannot be determined from information given

5. What is $g^{-1}(0)$?

A. -1 B. 0 C. 1 D. 2 E. 3

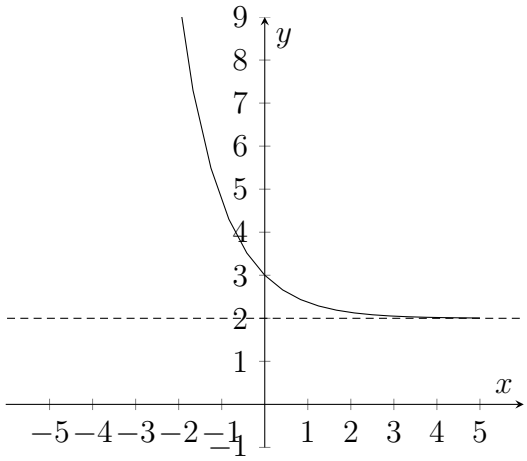
F. Cannot be determined from information given

6. Use laws of exponents to simplify the expression

$$\frac{x\sqrt{(x^2y^5)}z^{-2}}{(\sqrt{y})^3 z}$$

A. $\frac{x^2y}{z^3}$ B. $x^{3/2}yz^3$ C. $x^{3/2}yz^{-1}$ D. $\frac{xy^2}{z}$ E. $\frac{x^2}{yz^3}$

7. The graph of $h(x)$ with horizontal asymptote $y = 2$ is given below.



Which of the following could be the equation of $h(x)$?

A. $h(x) = \ln(x) + 2$ B. $h(x) = -\ln(x) + 2$ C. $h(x) = e^x + 2$

D. $h(x) = e^{-x} + 2$ E. $h(x) = -e^x + 2$ F. None of the above

8. Use properties of logarithms to write the expression as a single logarithm:

$$\log_2(x+1) + 4\log_2(x-2) - \log_2(2x-8)$$

A. $\log_2[(x+1)(x-2)^4(8-2x)]$

B. $\log_2[-4(x+1)(x-2)(2x-8)]$

C. $\log_2(3x+1)$

D. $\log_2 \dfrac{4(x+1)(x-2)}{2x-8}$

E. $\log_2 \dfrac{(x+1)(x-2)^4}{2x-8}$

F. None of the above

9. Let $f(x) = \log(x^2 - 4)$. What is the domain of $f(x)$?

A. $(2, \infty)$ B. $(-2, 2)$ **C.** $(\infty, -2) \cup (2, \infty)$

D. $[2, \infty)$ E. $[-2, 2]$ F. $(\infty, -2] \cup [2, \infty)$

10. Use the change of base formula to simplify:

$$\log_{27}(16)\log_2(7)\log_7(3)$$

A. 36 B. $\frac{3}{4}$ **C.** $\frac{4}{3}$ D. $\frac{13}{18}$ E. $\frac{16\cdot 7\cdot 3}{27\cdot 2\cdot 7}$

F. None of the above

11. Find all solutions for x.

$$\ln(x^2-1)=\ln(2-2x)$$

A. $\{-3,1\}$ B. $\{-1,3\}$ C. $\{1\}$ **D.** $\{-3\}$ E. No solution

12. Find all solutions for x.

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

A. $\{7\}$ B. $\{3\}$ C. $\{-1,4\}$ D. $\{4\}$ E. No solution

13. Find all solutions for x.

$$\log_5(x-2)=2$$

A. $\{27\}$ B. $\{2-\sqrt{5},2+\sqrt{5}\}$ C. $\{23\}$ D. $\{7\}$ E. No solution

14. Let $f(x)=e^{x-6}$. Find $f^{-1}(x)$.

A. $f^{-1}(x)=\frac{1}{e^x-6}$ **B.** $f^{-1}(x)=\ln(x)+6$ C. $f^{-1}(x)=\ln(x)-6$

D. $f^{-1}(x)=\ln(x-6)$ E. $f^{-1}(x)=-\ln(x+6)$ F. $f^{-1}(x)$ does not exist

15. Find all solutions for x.

$$6(3^x)+27=9^x$$

A. $\{1\}$ B. $\{1,2\}$ C. $\{-3,9\}$ **D.** $\{2\}$ E. No solution

16. Franny deposits \$500 to a bank account which earns 1.2% interest per annum compounded monthly. How much money does she have after 2 years?

A. $500(1.001)^2$ B. $500(1.01)^{24}$ **C.** $500(1.001)^{24}$ D. $500(1.01)^{24}$

E. None of the above

17. Zooey invests in a startup promising a 10% return per annum compounded continuously. Assuming the startup is successful, how long will it take him to double his money?

A. $(0.1)\ln(2) \approx .069$ years B. $(10\log_2(e) \approx 14.2$ years

C. $10\ln(2) \approx 6.93$ **years** D. $(0.1)\log_2(e) \approx .142$ years

E. None of the above

18. In a zombie apocalypse, one in ten (10%) of humans are turned (decay) each day. After how many days has the (living) world population been reduced to a third?

A. $20\ln(3) \approx 21.97$ days **B.** $10\ln(3) \approx 10.99$ **days** C. $10\ln(2) \approx 6.93$ days

D. $\ln(3) \approx 1.099$ days E. $5\ln(3) \approx 5.49$ days F. Insufficient information

19. Find the focus of the parabola with the equation $x^2 - 6x + 12y = 0$.

A. $(0, -3)$ B. $(0, \frac{3}{4})$ **C.** $(3, -\frac{9}{4})$ D. $(3, \frac{15}{4})$

E. Insufficient information

20. Find the equation of a parabola with directrix $x = -4$ and focus $(0, -1)$. (Hint: Find the vertex first.)

A. $(y-1)^2 = 4(x-2)$

B. $(y+1)^2 = 8(x+2)$

C. $(y+1)^2 = 4(x+2)$

D. $(x+1)^2 = 8(y+2)$

E. $(x-1)^2 = 8(y-2)$

F. None of the above/Insufficient information

1. D
2. B
3. B
4. E
5. A
6. A
7. D
8. E
9. C
10. C
11. D
12. A
13. A
14. B
15. D
16. C
17. C
18. B
19. C
20. B