Directions: This is a practice exam for the Math 122 Proficiency Test. If your initial or updated mathematics placement is "MTH 110 Fulfilled", you should take not only this practice test, but also the online proficiency test in an effort to increase your placement (as well as the one for MTH 123). There are two versions of the online proficiency test, and you may take each once (so if you don't pass the first time, you can have a second attempt).

MTH 122 is a college algebra course; many students find the content familiar from more advanced high school courses such as *Functions, Statistics, and Trigonometry*, or *Precalculus*. Taking the practice test, studying related ideas, and taking the proficiency test is important because if you can pass out of MTH 122, it saves you tuition costs and time to graduation. Use the following guidance for the practice exam to help you be as ready as possible for the actual proficiency test:

- The MTH 122 proficiency test is 30 minutes in length. For this practice exam, set a 30 minute timer for yourself.

- Like the MTH 122 proficiency test, this practice exam has 15 multiple choice questions. For each question on the practice exam and on the proficiency test itself, there are four possible answers listed, and exactly one is correct.

- You may use a graphing calculator for taking the online proficiency test, so you should also use one for the practice test. Use pencil and paper to track your own work and reasoning.

- Remember: the purpose of proficiency tests is to ensure you are placed into a course that is right for you. Doing the proficiency tests honestly and independently is the best way to assess your current mathematical preparation and help you be in the right class.

- On the online proficiency test, a score of 9/15 or higher places you out of MTH 122 (with an updated placement of "MTH 122 Fulfilled").

- The answers to this practice exam are found on the very last page of this document; you should fully attempt the entire exam before looking at the answers.
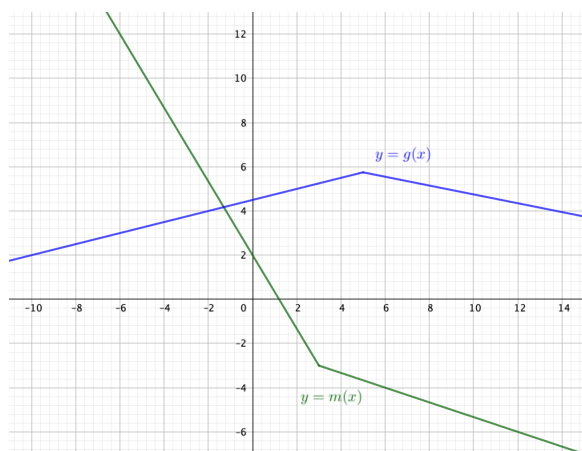
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1. Let $f(x) = 6x + 5$ and $g(x) = 7 - 4x$. Then, $g(f(x))$ is equivalent to

    (a) $-13 - 24x$

    (b) $12 - 24x$

    (c) $-24x^2 + 22x + 35$

    (d) $7 - 24x$

2. The average rate of change of $p(x) = x^2 + 2x + 3$ on the interval $1 \leq t \leq 4$ is

    (a) $\frac{21}{4}$

    (b) 21

    (c) 7

    (d) $\frac{1}{7}$

3. For the pictured function $y = m(x)$, which of the following statements is true?

(a) $m^{-1}(6) = -4$

(b) $m^{-1}(0) = 2$

(c) $m(14) = 4$

(d) $m^{-1}(-4) = 6$

4. A population of cells grows in such a way that there are 100 cells at time $t = 0$ hours, and the total number of cells in the population doubles every 24 hours. The function $P(t)$ that measures the total number of cells at time t in hours is given by:

(a) $P(t) = 100 \cdot 2^t$

(b) $P(t) = 100 + 100 \cdot \frac{t}{24}$

(c) $P(t) = 100e^{t/24}$

(d) $P(t) = 100 \cdot 2^{t/24}$

5. Given an equilateral triangle with side length a, the area of the triangle is

(a) $3a$

(b) $\frac{\sqrt{3}a^2}{8}$

(c) $\frac{\sqrt{3}a^2}{4}$

(d) $\frac{1}{2}a^2$

6. If $f(x) = \dfrac{5(x+4)}{x^2 - 25}$, then $f(x)$ has a vertical asymptote at

(a) $x = -4$ only

(b) $x = -5$ and $x = 5$ only

(c) $x = 5$ only

(d) $x = -5$, $x = -4$, and $x = 5$

7. If $\log_{10}(8 - 3x) = 2$, then $x =$

    (a) $-\frac{92}{3}$

    (b) no value of x makes this equation true

    (c) $\frac{92}{3}$

    (d) 2

8. If $\dfrac{x^2 - 13x + 12}{x - 4} = 0$, then $x =$

    (a) 1 or 12

    (b) -1 or -12

    (c) 1, 4, or 12

    (d) 4

9. If $g(x) = x^2 - 3x + 1$, then $f(a + 1) =$

    (a) $a^2 - a - 1$

    (b) $a^2 - 3a - 1$

    (c) $a^2 - a + 5$

    (d) $a^2 - 3a + 5$

10. The Fahrenheit temperature of a can of soda in a refrigerator at time t in minutes is given by $F(t) = 38 + 34e^{-0.1t}$. After how many minutes is the can's temperature 45 degrees?

    (a) 10

    (b) $10 \ln(\frac{45}{38})$

   (c) $10 \ln(\frac{7}{34})$

    (d) $-10 \ln(\frac{7}{34})$

11. Suppose that $y = f(x) = 2x^3 - 5$. A formula for $x = f^{-1}(y)$ is

    (a) $f^{-1}(y) = 2y^3 - 5$

    (b) $f^{-1}(y) = \sqrt[3]{\frac{y-5}{2}}$

    (c) $f^{-1}(y) = \sqrt[3]{\frac{y+5}{2}}$

    (d) $f^{-1}(y) = \sqrt[3]{2y^3 - 5}$

12. Suppose that $y = f(x)$ is given, and $y = g(x)$ is the transformation of $y = f(x)$ that results from shifting the graph of f by 5 units to the right and by 3 units down. Then

    (a) $g(x) = f(x + 5) - 3$

    (b) $g(x) = f(x + 5) + 3$

    (c) $g(x) = f(x - 5) - 3$

    (d) $g(x) = f(x - 3) + 5$

13. Suppose that $f(x) = a^x$ and $g(x) = b^x$ are both exponential functions and a and b are both positive real numbers.
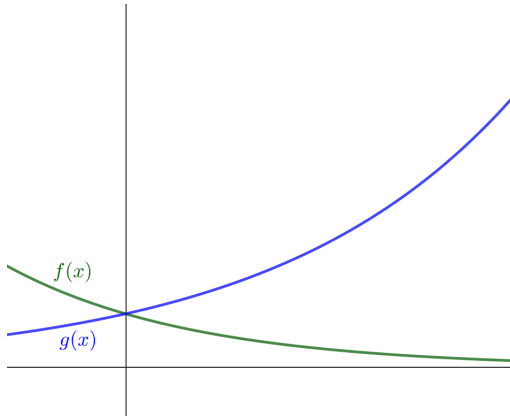
Which of the following statements is true?

(a) $1 < a < b$

(b) $a < b < 1$

(c) $a < 1 < b$

(d) $b < 1 < a$

14. If $f(x) = 100 - 95e^{-0.005x}$, which of the following statements is true?

(a) $f(x)$ is a decreasing function

(b) As x increases without bound, $f(x)$ approaches 100

(c) There is a real number x for which $f(x) > 100$

(d) $f(0) = 100$

15. In the figure below, if the curve is given by the function $f(x) = 4 - x^2$ and the point B is located at $(b, 0)$, what are the dimensions of the pictured rectangle?
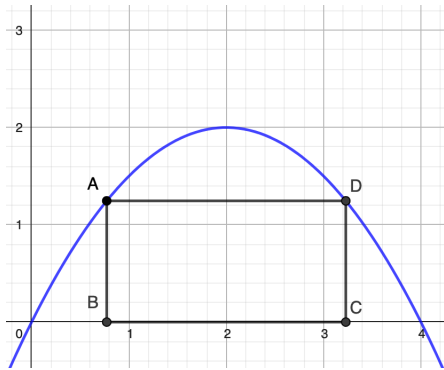
(a) $b \times (4 - b^2)$

(b) $b \times 2b$

(c) $(4 - 2b) \times (2 - b)$

(d) $(4 - 2b) \times (4 - b^2)$

Answers

1. a
2. c
3. d
4. d
5. c
6. b
7. a
8. a
9. a
10. d
11. c
12. c
13. c
14. b
15. d