Algebra II Practice SOL

Name *Master E*
Date_____ Block___ pg 1

Identify the choice that best completes the statement or answers the question. Show all work beside each problem. If you used your calculator, EXPLAIN briefly what you did.

1. Which equation is the inverse of the function?

(A11.7g)

$$f(x) = \frac{\sqrt{x-2}}{3} + 1$$

$X = \frac{\sqrt{y-2}}{3} + 1$

a. $f^{-1}(x) = \frac{\sqrt{x+2}}{3} - 1$

$X - 1 = \frac{\sqrt{y-2}}{3}$

b. $f^{-1}(x) = (3x-3)^2 + 2$

c. $f^{-1}(x) = (3x-1)^2 + 2$

$3X - 3 = \sqrt{y-2}$

d. $f^{-1}(x) = 9x^2 - 7$

$(3x-3)^2 = y - 2$

$(3x-3)^2 + 2 = y$

2. Determine the number of real and complex solutions of the following quadratic equation.

(A11.4b)

$$3x^2 - 2x + 1 = 0$$

a. One complex solution
b. One real solution
c. Two complex solutions
d. Two real solutions

$\frac{2 \pm \sqrt{4 - 4(3)}}{6}$

$\frac{2 \pm \sqrt{-8}}{6}$

$\frac{2 \pm 2i\sqrt{2}}{6}$

$\frac{1 \pm i\sqrt{2}}{3}$

3. Which is a simplified form of the following expression?

(A11.1a)

$$\frac{7}{5x} - \left(-\frac{3}{4x}\right)$$

$\frac{7}{5x} + \frac{3}{4x}$

a. $\frac{4}{x}$

b. $\frac{13}{20x}$

c. $\frac{10}{9x}$
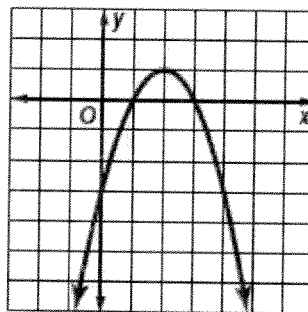
d. $\frac{43}{20x}$

$\frac{28}{20x} + \frac{15}{20x}$

$\frac{43}{20x}$

4. Identify the parent function associated with the following graph.

(A11.6)

a. $f(x) = e^x$
b. $f(x) = |x|$
c. $f(x) = x^2$
d. $f(x) = x^3$

5. The time, t (in hours), you need to travel 90 miles from Harrisonburg to Richmond varies inversely with the rate, r (in miles per hour), that you drive. When traveling 60 miles per hour, you need 1.5 hours to reach your destination. Which equation correctly relates the variables t and r?

(A11.10)

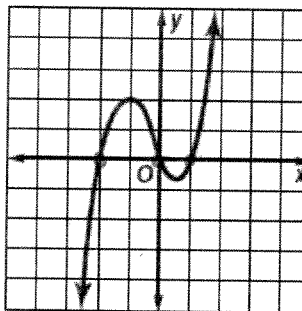a. $\frac{r}{t} = 90$

b. $\frac{t}{r} = 90$

c. $r = 90t$

d. $rt = 90$

$t = \frac{k}{r}$ $\frac{k}{60} = 1.5$

$k = 90$

$t = \frac{90}{r}$

6. What are the x-intercepts of the graph?

(A11.7c)

a. 0
b. $-2, 0, 1$
c. $x \in$ Real Numbers
d. $y \in$ Real Numbers

(A11.2)

7. The formula for the nth term of an arithmetic sequence is

$a_n = a_1 + (n-1)d$. $\underline{-14}, \underline{-8}, -2, \underline{4}^{+6}$

Find the nth term of an arithmetic sequence with a common difference of 6 and a third term of –2.

a. $a_n = 6n - 8$
b. $a_n = 6n - 14$
c. $a_n = 6n - 20$
d. $a_n = 20 - 14n$

[handwritten] $a_n = -14 + (n-1)(6)$
$-14 + 6n - 6$
$6n - 20$

(A11.2)

8. A student from Virginia finished 2nd in the 2009 Scripps National Spelling Bee. In how many ways could the top 11 finishers have finished in the top three places?

a. 990
b. 1,331
c. 2,744
d. 3.99×10^7

[handwritten] $11 P_3 = 990$

(A11.7e)

9. Which are the vertical and horizontal asymptotes of the following equation?

$f(x) = \dfrac{x-1}{x+3}$

a. Vertical: $x = -3$; Horizontal: $y = 1$
b. Vertical: $x = 3$; Horizontal: $y = -1$
c. Vertical: $y = -3$; Horizontal: $x = 1$
d. Vertical: $y = 3$; Horizontal: $x = -1$

(A11.4a)

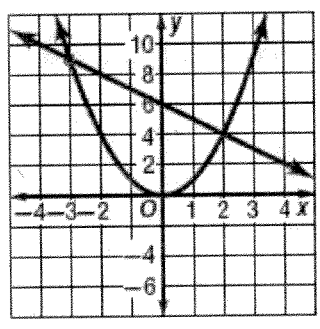10. What is the solution set of the following inequality?

$|2x + 4| < 10$

a. $x < 3$
b. $x > -2$
c. $-3 < x < 7$
d. $-7 < x < 3$

[handwritten]
$2x + 4 < 10 \qquad 2x + 4 > -10$
$2x < 6 \qquad\qquad 2x > -14$
$x < 3 \qquad\qquad x > -7$

$-7 < x < 3$

(A11.5)

11. Which is the apparent solution set to the system of equations shown?

a. $\{(0, 0)\}$
b. $\{(0, 0), (6, 0)\}$
c. $\{(0, 6)\}$
d. $\{(2, 4), (-3, 9)\}$

(A11.16)

12. Which *best* represents the simplified form of the following expression?

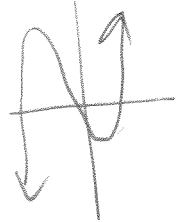$\left(3\sqrt{6ab}\right) \bullet \left(-\sqrt{15ac}\right)$

a. $-6\sqrt{90a^2 bc}$
b. $-9\sqrt{10abc}$
c. $-9a\sqrt{10bc}$
d. $9a\sqrt{10bc}$

[handwritten]
$-3\sqrt{90a^2 bc}$
$-3\sqrt{9 \cdot 10 \cdot a^2 \cdot b \cdot c}$
$-3 \cdot 3 \cdot a$
$-9a\sqrt{10bc}$

(A11.7f)

13. Which *best* describes the end behavior of the graph of the function?

$f(x) = x^3 + 2x^2 - 5x$

a. $\lim\limits_{x \to \infty} f(x) = \infty$ and $\lim\limits_{x \to -\infty} f(x) = \infty$
b. $\lim\limits_{x \to \infty} f(x) = -\infty$ and $\lim\limits_{x \to -\infty} f(x) = -\infty$
c. $\lim\limits_{x \to \infty} f(x) = \infty$ and $\lim\limits_{x \to -\infty} f(x) = -\infty$
d. $\lim\limits_{x \to \infty} f(x) = -\infty$ and $\lim\limits_{x \to -\infty} f(x) = \infty$

(A11.4d)

14. What is the solution to the following equation?

$$(x-3)^{\frac{3}{2}} = -8$$

(handwritten) $X-3 = (-8)^{\frac{2}{3}} (-2)^2$
$X-3 = 4$
$X = 7$

a. $x = -5$
b. $x = 4$
c. $x = 7$
d. $x = \{\emptyset\}$ *(circled)*

(handwritten) extraneous soln

(A11.9)

15. Melvin's Electronics monitors its DVD sales on a weekly basis. The table shows the number of DVDs sold in the past four weeks and the dollars generated by those sales.

(handwritten) X   y

Week	Number of DVDs Sold	Dollars Generated
1	50	$997.50
2	65	$1,296.80
3	40	$798.00
4	70	$1,396.50

Based on the line of best fit for the data, which is the *best* prediction for the amount of money generated by selling 85 DVDs in week 6?

a. $119.67
b. $1,596.03
c. $1,695.78 *(circled)*
d. $1,895.29

(handwritten) $y = 19.95X - .03$
When $X = 85$
$y = 1695.78$

(A11.1d)

16. What is the factored form of the following polynomial?

$x^4 - 27x$

(handwritten) $X(X^3 - 27)$
$X(X - 3)(X^2 + 3X + 9)$

a. $x(x-3)(x^2 + 3x + 9)$ *(circled)*
b. $x(x^3 - 27)$
c. $x(x+3)(x^2 - 3x + 9)$
d. $x(x-3)^3$

17. Which *best* describes the domain of the function graphed?
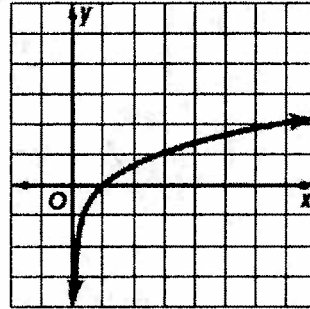
(A11.1a)

a. $x \in$ Real Numbers
b. $x > 0$ *(circled)*
c. $y \in$ Real Numbers
d. $y > 0$

(A11.4d)

18. What is the solution to the following equation?

(handwritten) $\sqrt{16} = 12 - 2\sqrt{16}$ $4 = 12 - 2(4)$ ✓

$$\sqrt{x+1} = 12 - 2\sqrt{x+1}$$

a. $x = 5$
b. $x = 15$ *(circled)*
c. $x = 17$
d. $x = 143$

(handwritten) $3\sqrt{X+1} = 12$
$\sqrt{X+1} = 4$
$X+1 = 16$
$X = 15$

(A11.3)

19. Which is a simplified form of the following expression?

$-2i(-5 + 7i)$

(handwritten) $10i - 14i^2$
$14 + 10i$

a. $-14 + 10i$
b. $10i - 14i^2$
c. $14 + 10i$ *(circled)*
d. $17i$

(A11.7h)

20. Which represents the composition $g(f(x))$ for the following functions?

$f(x) = 3x^2 - 1$
$g(x) = 2x$

(handwritten) $2(3X^2 - 1)$
$6X^2 - 2$

a. $6x^2 - 2$ *(circled)*
b. $12x^2 - 1$
c. $6x^3 - 2x$
d. $6x^3 - 1$

(A11.1c)

21. Which *best* represents the following expression?

$\left(3^{3}\right)^{\frac{2}{3}}$

$27^{\frac{2}{3}} x^{\frac{2}{3}} y^{\frac{1}{3}}$

$9\sqrt[3]{x^{2}y}$

a. $\sqrt{729x^{2}y}$

b. $\left(27xy\right)^{\frac{4}{27}}$

c. $9\sqrt[3]{x^{2}y}$ *(circled)*

d. $\left(2xy\right)^{\frac{5}{3}}$

(A11.7b)

22. Which is an apparent zero of the function graphed?

a. 0
b. –2 *(circled)*
c. –6.25
d. –6.5

(A11.11)
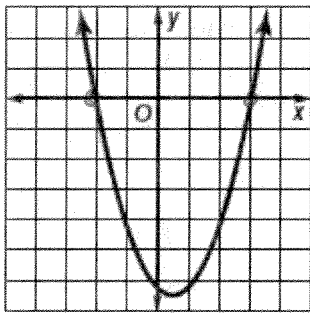
23. The table shows the number of injuries caused by lightning strikes in Virginia for 1959–2000.

Month	Injuries
March	6
April	3
May	15
June	35
July	83
August	56
September	10

Assume the data is normally distributed with a monthly mean of 29.71 and a standard deviation of $\sigma = 27.88$. What is the probability that a randomly-selected injury incident is between 29.71 and 57.59?
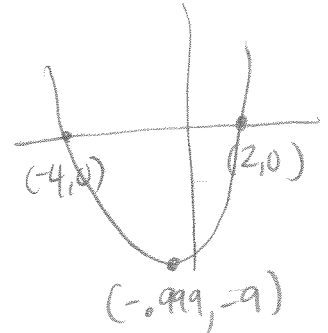

29.71   57.59

a. 0.34 *(circled)*
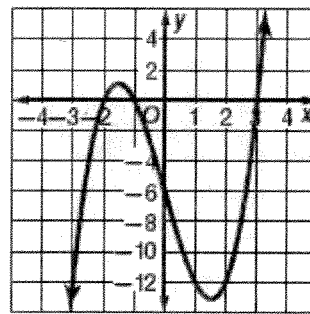b. 0.68
c. 0.815
d. 0.95

(A11.7a)

24. Which is an apparent turning point of the following function?

$f(x) = x^{2} + 2x - 8$

(–4,0)   (2,0)

(–.999, –9)

a. (–4, 0)
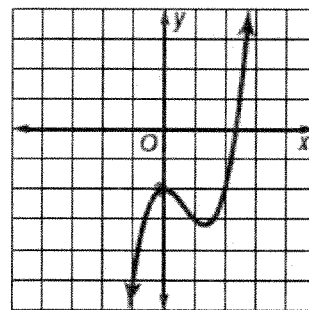b. (–1, –9) *(circled)*
c. (0, –8)
d. (2, 0)

(A11.8)

25. Which is a factored form of the function shown by the graph?

–2, –1, 3

$(x+2)(x+1)(x-3)$

a. $x^{3} - 7x + 6$
b. $x^{3} - 7x - 6$
c. $(x+3)(x-1)(x-2)$
d. $(x - 3)(x + 1)(x + 2)$ *(circled)*

(A11.7c)

26. Identify the *y*-intercept of the function shown by the graph.

(0, –2)

a. 2.34
b. 0
c. –2 *(circled)*
d. –3.19

All.1d

27. Factor the following polynomial over the set of real numbers. $x^4 - 16$

$(x^2+4)(x^2-4)$

$(x^2+4)(x+2)(x-2)$

a. $(x - 2i)^2(x + 2i)^2$
b. $(x - 2)(x + 2)(x - 2i)(x + 2i)$
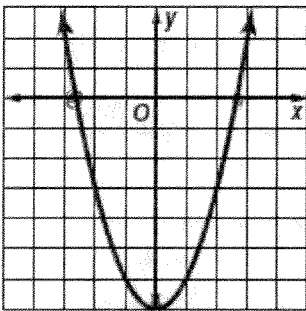c. $(x^2 - 4)(x^2 + 4)$
d. $(x - 2)(x + 2)(x^2 + 4)$

All.4d

28. What is the solution to the following equation?

$-3\sqrt{x} - 5 = 2\sqrt{x} - 20$

$-5 = 5\sqrt{x} - 20$
$15 = 5\sqrt{x}$
$3 = \sqrt{x}$
$9 = x$

a. $x = \sqrt{3}$
b. $x = 9$
c. $x = 225$
d. $x = \{\varnothing\}$

All.7cd

$-3 \cdot 3 - 5 = -14 = 6 - 20$ ✓

29. Identify the interval(s) over which the following function is decreasing.

a. $(-\infty, -2.65), (2.65, \infty)$
b. $(-2.65, 2.65)$
c. $(-\infty, 0)$
d. $(0, \infty)$

All.6

30. Each statement describes a transformation of the graph of $y = x^3$. Which statement correctly describes the graph of $y = (x + 4)^3 - 2$?

$\leftarrow 4 \downarrow 2$

a. It is the graph of $y = x^3$ translated two units up and 4 units left.
b. It is the graph of $y = x^3$ translated two units up and 4 units right.
c. It is the graph of $y = x^3$ translated two units down and 4 units left.
d. It is the graph of $y = x^3$ translated two units down and 4 units right.

All.1a

31. Which is a simplified form of the following expression?

$\dfrac{1}{x} + \dfrac{1}{2x} + \dfrac{1}{3x}$

$\dfrac{6}{6x} + \dfrac{3}{6x} + \dfrac{2}{6x}$

$\dfrac{11}{6x}$

a. $\dfrac{1}{x}$
b. $\dfrac{1}{2x}$
c. $\dfrac{1}{6x}$
d. $\dfrac{11}{6x}$

All.4b

32. Which represents a solution to the following polynomial equation over the complex numbers?
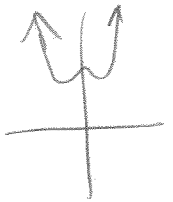
$2x^2 - 4x + 3 = 0$

$x = \dfrac{4 \pm \sqrt{16 - 4(6)}}{4}$

$\dfrac{4 \pm \sqrt{-8}}{4}$

$\dfrac{4 \pm 2i\sqrt{2}}{4} \quad \dfrac{2 \pm i\sqrt{2}}{2}$

a. $1 \pm 2i\sqrt{2}$
b. $2 \pm i\sqrt{2}$
c. $\dfrac{2 + \sqrt{10}}{2}$
d. $\dfrac{2 + i\sqrt{2}}{2}$

All.7f

33. Which *best* describes the end behavior of the graph of the function?
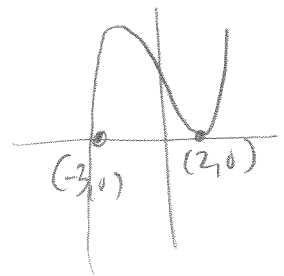
$f(x) = x^4 - 2x^2 + 4$

a. $\lim\limits_{x \to \infty} f(x) = \infty$ and $\lim\limits_{x \to -\infty} f(x) = \infty$
b. $\lim\limits_{x \to \infty} f(x) = -\infty$ and $\lim\limits_{x \to -\infty} f(x) = -\infty$
c. $\lim\limits_{x \to \infty} f(x) = \infty$ and $\lim\limits_{x \to -\infty} f(x) = -\infty$
d. $\lim\limits_{x \to \infty} f(x) = -\infty$ and $\lim\limits_{x \to -\infty} f(x) = \infty$

All.8

34. Which number is a zero of the following polynomial function?
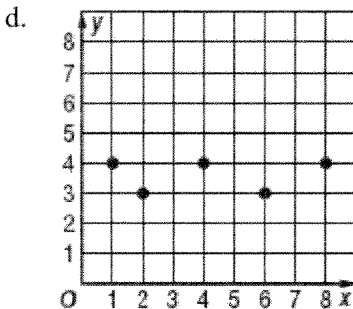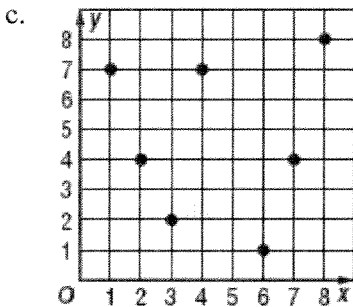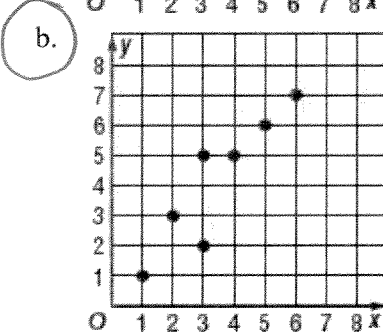
$f(x) = x^3 - x^2 - 8x + 12$
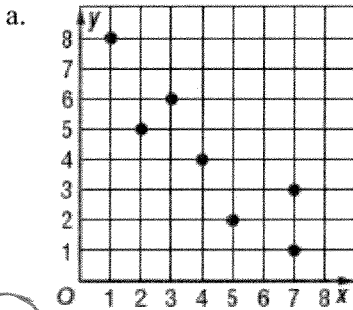
a. -2
b. 1
c. 2
d. 12

$(-3, 0) \quad (2, 0)$

35. Data was collected and graphed on a scatter plot. Which set of data points shows a positive correlation?

a.

b.

c.

d.

36. Which is a simplified form of the following expression?

$$\dfrac{\dfrac{1}{\sqrt{2}}}{\dfrac{\sqrt{2}}{2}}$$

   a. 0
   b. $\dfrac{1}{2}$
   c. 1
   d. $\sqrt{2}$

$$\frac{1}{\sqrt{2}} \cdot \frac{2}{\sqrt{2}} = \frac{2}{2} = 1$$

37. The formula for the sum of an infinite geometric series is

For $|r| < 1$, $S = \dfrac{a_1}{1-r}$.

What is the sum of the series?

$$\frac{1}{2} - \frac{1}{6} + \frac{1}{18} - \frac{1}{54} + \cdots$$

   a. $\dfrac{3}{4}$
   b. $\dfrac{2}{3}$
   c. $\dfrac{3}{8}$
   d. $-\dfrac{2}{3}$

$$\frac{-\frac{1}{6}}{\frac{1}{2}} = \frac{1}{6} \cdot 2 = -\frac{1}{3}$$

$$\frac{\frac{1}{2}}{1+\frac{1}{3}}$$

.378

38. Which graph represents the solution to the following inequality?

$|x - 2| + 1 < 4$

$x-2<3 \quad x-2>-3$
$x<5 \quad x>-1$
AND

   a.

   b.

   c.

   d.

$-1<x<5$

39. Which *best* describes the range of the following function?

$f(x) = |x| - 2$


   a. $(0, -2)$
   b. $(-2, 0), (2, 0)$
   c. $y \geq -2$
   d. Real numbers

40. The table shows the average number of thunderstorm days per month in Virginia over a 42-year period.

Month	Days
January	0.2
February	0.4
March	1.6
April	2.4
May	5.4
June	6.8
July	8.8
August	6.7
September	2.9
October	1.0
November	0.7
December	0.3

Assume the data is normally distributed with a mean of 3.1 and a standard deviation of 2.9. What percent of the data would be expected to lie between 0.2 and 6.0?

a. 0.95
b. 0.68
c. 0.5
d. 0.475
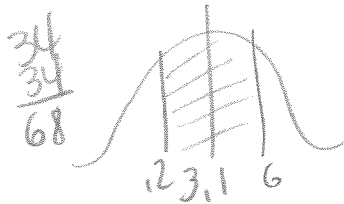
41. Which of the following represents the equation(s) of the vertical and horizontal asymptotes of the following graph?
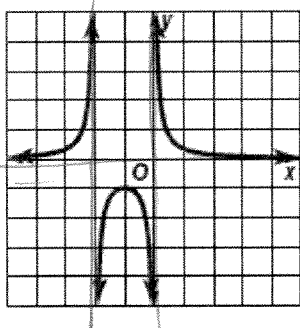
a. vertical: $x = -2$; Horizontal: $y = 0$
b. vertical: $x = -2$ and $x = 0$; Horizontal: none
c. vertical: $y = 0$; Horizontal: $x = -2$ and $x = 0$
d. vertical: $x = -2$ and $x = 0$; Horizontal: $y = 0$

42. What is the solution to the following equation?

$$\frac{1}{x+2} = \frac{x}{x+2}$$

a. No solution
b. $x = 1$
c. $x = -2$ and $x = 1$
d. $x = -1$ and $x = 2$

43. Find the exact solution(s) to the system of equations shown below.

$f(x) = x^2 - 1$

$g(x) = x^2 - 4$

a. $(0, -1)$ and $(0, -4)$
b. $(1, 0)$ and $(-1, 0)$
c. $(2, 0)$ and $(-2, 0)$
d. No solution

44. If $f(x)$ and $g(x)$ are inverse functions, which statement is true?

a. $f(x) = -g(x)$
b. $f(x) + g(x) = 0$
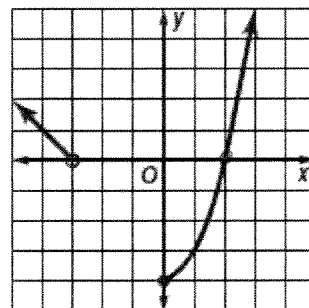c. $f(x)$ is the reciprocal of $g(x)$.
d. $f(g(x)) = g(f(x)) = x$

45. Which equation shows the variable a varying jointly with the variables b and c?

a. $b = 4ac$
b. $a = 4bc$
c. $c = 4ab$
d. $abc = 4$

46. Which identifies all of the zeros of the function graphed?

a. 2
b. -3
c. -4
d. $(-3, 0)$

(AII.12)

47. The Country Club of Virginia in Richmond has three 18-hole golf courses. In how many ways could an individual play all three courses?

$3! = 3 \cdot 2 \cdot 1 = 6$

$3P_3 = 6$

a. 1
b. 3
c. 6
d. 9

(AII.3)

48. Which table has been completed correctly?

a.

$i^2 = 1$	$i^5 = i$	$i^{12} = -1$

b.

$i^7 = -i$ ✓	$i^{21} = i$ ✓	$i^{40} = 1$ ✓

c.

$i^8 = 1$ ✓	$i^{21} = -i$ ✓	$i^{60} = 1$

d.

$i^{11} = i$	$i^{22} = i$	$i^{31} = -i$

(AII.1c)

49. Which is a simplified form of the following expression?

$$\sqrt{16a^2 b^5 c^5}$$

$4a\sqrt{b^4 bc^4 c}$

$4ab^2 c^2 \sqrt{bc}$

a. $2bc\sqrt{2a^2 b^2}$
b. $8ab^2 c\sqrt{bc}$
c. $4ab^2 c^2 \sqrt{bc}$
d. $256a^4 b^5 c^6$

(AII.7h)

50. Suppose $h(x) = x^2 - 16$. Identify two functions $f(x)$ and $g(x)$ such that $f \circ g = h$.

a. $f(x) = x - 4$ and $g(x) = x + 4$
b. $f(x) = x - 16$ and $g(x) = x^2$
c. $f(x) = x^2$ and $g(x) = -16$
d. $f(x) = x^2$ and $g(x) = x - 16$

a $f(g(x)) = x + 4 - 4 = x$

b. $x^2 - 16$