Solu

MHF4U1- ASSIGNMENT 8

True/False
Indicate whether the statement is true or false.

T 1. Subtracting one function from another is equivalent to adding the opposite.

T 2. To add two functions, you simply add the corresponding y-coordinates to get the combined function value.

T 3. When two functions are added, the domain of the combined function consists of all of the values common to the domain of both of the original functions.

F 4. Given the cost function, $C(n)$, and the revenue function, $R(n)$, for a company, the profit function is given by $P(n) = C(n) - R(n)$.

F 5. When two functions are multiplied, the range of the combined function consists of all of the values in the range of both of the original functions.

F 6. When two functions are divided, the domain of the combined function consists of all of the values in the domains of the original functions.

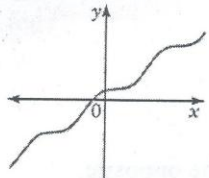
F 7. To solve the inequality $f(x) > g(x)$, a student could graph the combined function $y = f(x) - g(x)$ and identify the portions of the graph that are below the x-axis.

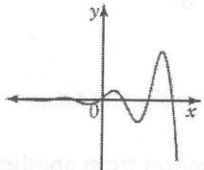
Multiple Choice
Identify the choice that best completes the statement or answers the question.

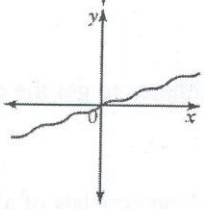
b 8. Given the functions $f(x) = x^2 + 1$ and $g(x) = 3 - x$, determine an equation for the combined function $y = f(x) + g(x)$.
a. $y = x^2 - x + 2$
b. $y = x^2 - x + 4$
c. $y = x^2 + x + 4$
d. $y = x^2 + x - 2$

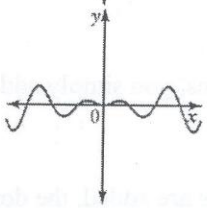
c 9. Given the functions $f(x) = x^2 + 1$ and $g(x) = 3 - x^2$, determine an equation for the combined function $y = f(x) - g(x)$.
a. $y = 2x^2 + 2$
b. $y = x^2 - x - 2$
c. $y = 2x^2 - 2$
d. $y = -2$

b 10. Given the functions $f(x) = \sin x$ and $g(x) = x$, a graph of the combined function $y = f(x) + g(x)$ most likely resembles

a. 

c. 

b. 

d. 

b 11. Given the functions $f(x) = \sin x$ and $g(x) = x$, determine the domain of the combined function $y = f(x) + g(x)$.

a. $\{x \in \mathbb{R}, -2\pi \le x \le 2\pi\}$
b. $\{x \in \mathbb{R}\}$
c. $\{x \in \mathbb{R}, -1 \le x \le 1\}$
d. cannot be determined

a 12. Given the functions $f(x) = \sqrt{x+3}$ and $g(x) = x^2 + 2x - 8$, determine the domain of the combined function $y = f(x) - g(x)$.

a. $\{x \in \mathbb{R}, x \ge -3\}$
b. $\{x \in \mathbb{R}, x \ge -8\}$
c. $\{x \in \mathbb{R}, -4 \le x \le 2\}$
d. cannot be determined

b 13. Given the functions $f(x) = \sin x$ and $g(x) = 3$, determine the range of the combined function $y = f(x) + g(x)$.

a. $\{y \in \mathbb{R}\}$
b. $\{y \in \mathbb{R}, 2 \le y \le 4\}$
c. $\{y \in \mathbb{R}, -1 \le y \le 1\}$
d. $\{y \in \mathbb{R}, -3 \le y \le 3\}$

a 14. Given the functions $f(x) = x^3$ and $g(x) = x^3 - x^2 + 4$, determine the range of the combined function $y = f(x) - g(x)$.

a. $\{y \in \mathbb{R}, y \ge -4\}$
b. $\{y \in \mathbb{R}, y \ge -2\}$
c. $\{y \in \mathbb{R}\}$
d. $\{y = 4\}$

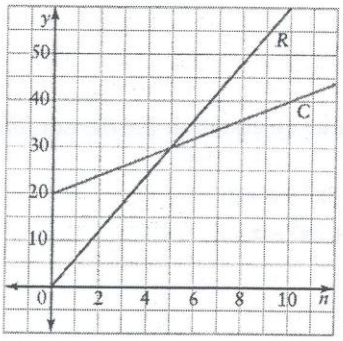
b 15. If $f(x)$ is a linear function and $g(x)$ is a quadratic function, then what type of function is $y = f(x) + g(x)$?

a. linear
b. quadratic
c. cubic
d. cannot be determined for sure

b 16. If $f(x)$ and $g(x)$ are even functions, then what type of function is $y = f(x) - g(x)$?

a. odd
b. even
c. neither
d. cannot be determined for sure

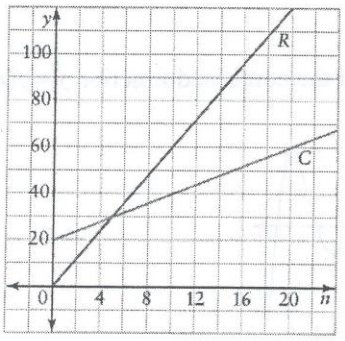
C 17. The graphs of the total cost function and the revenue function for a certain company producing n items are shown.



What is the break-even point for the company?

a. $n = 0$
b. $n = 3$
c. $n = 5$
d. $n = 20$

C 18. The graphs of the daily total cost function and the revenue function for a certain school club producing n items are shown.



How many items must the club sell to generate a profit of \$40/day?

a. $n = 5$
b. $n = 10$
c. $n = 15$
d. $n = 20$

d 19. The revenue function for a company selling n coffee mugs can be modelled by the function $R(n) = 10n$, and the total cost function can be modelled by the function $C(n) = 360 + 6n$. Determine a simplified equation for $P(n)$, the profit function for the company.

a. $P(n) = 360 + 4n$
b. $P(n) = 360 - 4n$
c. $P(n) = 16n - 360$
d. $P(n) = 4n - 360$

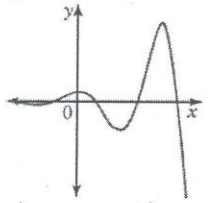
a 20. Given the functions $f(x) = x^2 + 1$ and $g(x) = 3 - x$, determine an equation for the combined function $y = f(x)\,g(x)$.

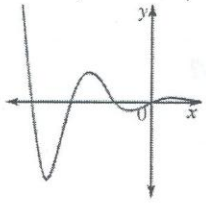
a. $y = -x^3 + 3x^2 - x + 3$
b. $y = -x^3 + 3x^2 + x - 3$
c. $y = x^3 + 3x^2 - x + 3$
d. $y = -x^3 + 2x^2 - x + 3$

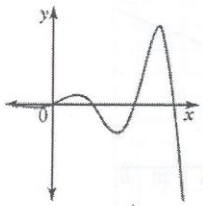
a 21. Given the functions $f(x) = x^3 - x$ and $g(x) = x - 1$, determine an equation for the combined function $y = \dfrac{f(x)}{g(x)}$.

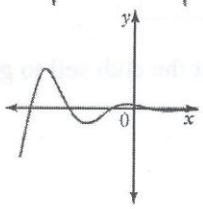
a. $y = x^2 + x,\ x \neq 1$
b. $y = \dfrac{x}{x-1},\ x \neq 1$
c. $y = x^2 - x,\ x \neq 1$
d. $y = \dfrac{x^2 - x}{x-1},\ x \neq 1$

a 22. Given the functions $f(x) = 1.4^x$ and $g(x) = \cos x$, a graph of the combined function $y = f(x)\,g(x)$ most likely resembles

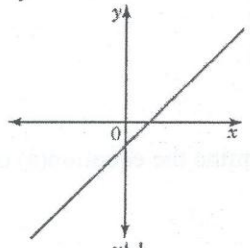
a.


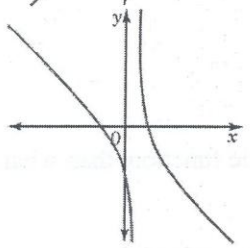
b.


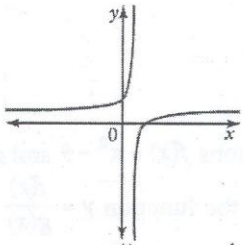
c.


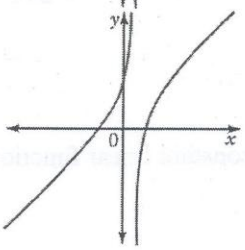
d.


d 23. Given the functions $f(x) = x^2 - 4$ and $g(x) = x - 1$, a graph of the combined function $y = \dfrac{f(x)}{g(x)}$ most likely resembles

a. 

b. 

c. 

d. 

d 24. Given the functions $f(x) = \cos(x)$ and $g(x) = x^2 - 5x - 6$, determine the domain of the combined function $y = \dfrac{f(x)}{g(x)}$.

a. $\left\{x \in \mathbb{R}, x \neq \dfrac{\pi}{2}, x \neq \dfrac{3\pi}{2}\right\}$

b. $\{x \in \mathbb{R}, x \neq -2, x \neq -3\}$

c. $\{x \in \mathbb{R}, x \neq 2, x \neq 3\}$

d. $\{x \in \mathbb{R}, x \neq -1, x \neq 6\}$

c 25. Given the functions $f(x) = 2^x$ and $g(x) = x^2$, determine the range of the combined function $y = \dfrac{f(x)}{g(x)}$.

a. $\{y \in \mathbb{R}, y \neq 0\}$

b. $\{y \in \mathbb{R}, y > 0\}$

c. $\{y \in \mathbb{R}, y > 1\}$

d. $\{y \in \mathbb{R}\}$

a 26. In general, the zeros of a function $f(x)$ appear on the graph of $y = f(x)g(x)$ as

a. x-intercepts
b. holes
c. vertical asymptotes
d. local extreme points

d 27. The zeros of a function $g(x)$ appear on the graph of $y = \dfrac{f(x)}{g(x)}$ as

a. x-intercepts
b. holes
c. vertical asymptotes
d. B or C

d

28. Given the functions $f(x) = x^2 - 9$ and $g(x) = x^2 - 5x - 6$, determine the equations of the vertical asymptotes of the function $y = \dfrac{f(x)}{g(x)}$.

a. $x = 3, x = -3$
b. $x = 2, x = -3$
c. $x = 1, x = -6$
d. $x = -1, x = 6$

b

29. Given the functions $f(x) = x^2 - 9$ and $g(x) = x^2 - 5x + 6$, determine the equation(s) of the vertical asymptote(s) of the function $y = \dfrac{f(x)}{g(x)}$.

a. $x = 3, x = -3$
b. $x = 2$
c. $x = 2, x = 3$
d. $x = 3$

c

30. If $f(x)$ is a non-constant linear function and $g(x)$ is a quadratic function, then what type of function is $y = f(x)\,g(x)$?

a. linear
b. quadratic
c. cubic
d. cannot be determined for sure

b

31. If $f(x)$ and $g(x)$ are odd functions, then what type of function is $y = f(x)\,g(x)$?

a. odd
b. even
c. neither
d. cannot be determined for sure

a

32. If $f(x)$ is a odd function and $g(x)$ is an even function, then what type of function is $y = \dfrac{f(x)}{g(x)}$?

a. odd
b. even
c. neither
d. cannot be determined for sure

b

33. The zeros of a function $f(x)$ are 3 and 4, while the zeros of a second function $g(x)$ are 3 and 5. What are the zero(s) of the function $y = \dfrac{f(x)}{g(x)}$?

a. $x = 3$
b. $x = 4$
c. $x = 4, x = 5$
d. $x = 3, x = 4, x = 5$

d

34. The zeros of a functions $f(x)$ are 3 and 4, while the zeros of a second function $g(x)$ are 3 and 5. What are the zeros of the function $y = f(x)\,g(x)$?

a. $x = 3$
b. $x = 4$
c. $x = 4, x = 5$
d. $x = 3, x = 4, x = 5$

b

35. Given the functions $f(x) = x^2 - x$ and $g(x) = x - 1$, determine an equation for the composite function $y = f(g(x))$.

a. $y = x^2 - 3x + 1$
b. $y = x^2 - 3x + 2$
c. $y = x^2 - x - 1$
d. $y = x^2 - x + 1$

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

c 36. Given the functions $f(x) = 3^x$ and $g(x) = \sin x$, determine the domain of the combined function $y = f(g(x))$.

a. $\{x \in \mathbb{R}, -1 \le x \le 1\}$
b. $\{x \in \mathbb{R}, x > 0\}$
c. $\{x \in \mathbb{R}\}$
d. cannot be determined

b 37. Given the functions $f(x) = 3^x$ and $g(x) = \sin x$, determine the range of the combined function $y = f(g(x))$.

a. $\left\{y \in \mathbb{R}, -1 \le y \le 1\right\}$
b. $\left\{y \in \mathbb{R}, \frac{1}{3} \le y \le 3\right\}$
c. $\left\{y \in \mathbb{R}\right\}$
d. $\left\{y \in \mathbb{R}, -3 \le y \le 3\right\}$

d 38. Consider the tables of values for the two functions shown.

x	$y = f(x)$	$y = g(x)$
–2	1	–2
–1	2	1
0	3	–1
1	4	0

What is the value of $f(g(-1))$?

a. 1
b. 2
c. 3
d. 4

d 39. Consider the tables of values for the two functions shown.

x	$y = f(x)$	$y = g(x)$
–2	1	–2
–1	2	1
0	3	–1
1	4	0

What is the value of $g(f(1))$?

a. –1
b. –2
c. 1
d. cannot be determined

c 40. Given the functions $f(x) = 3x - 2$ and $g(x) = 5^x$, determine the value of $f(g(1))$.

a. 5
b. 8
c. 13
d. 25

a 41. Given the functions $f(x) = \cos x$ and $g(x) = \sqrt{10 + x}$, determine the value of $g(f(\pi))$.

a. 3
b. 9
c. $\sqrt{11}$
d. $\sqrt{\pi}$

d 42. Given the function $f(x) = x^2 + 1$, determine the value of $f(f(3))$.

a. 3
b. 10
c. 100
d. 101

C 43. Given the function $f(x) = \log x$, determine the value of $f(f^{-1}(23))$.

a. 10^{23}
b. 2.3
c. 23
d. 230

d 44. Given a function $f(x)$ and $g(x) = 3(x - 1)$, how would the graph of $y = f(x)$ compare to the graph of $y = f(g(x))$?

a. vertically stretched and translated to the right
b. horizontally compressed and translated to the left
c. horizontally stretched and translated to the right
d. horizontally compressed and translated to the right

b 45. Given a function $f(x)$ and $g(x) = -x + 1$, how would the graph of $y = f(x)$ compare to the graph of $y = f(g(x))$?

a. reflected in the x-axis and translated to the right
b. reflected in the y-axis and translated to the right
c. reflected in the x-axis and translated to the left
d. reflected in the y-axis and translated to the left

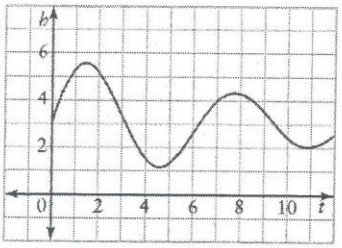
b 46. Jenny and Jimmy are a married couple who work at the same store. Jimmy's total weekly salary, in dollars, if he sells x items is given by $S = 100 + 5x$, and Jenny's total weekly salary, in dollars, if she sells x items is given by $S = 80 + 6x$. Assuming that they sell the same number of items in a week, what is the minimum number of items they each need to sell to make their combined weekly salary greater than \$1000?

a. 74
b. 75
c. 90
d. 180

C 47. Jenny and Jimmy are a married couple who work at the same store. Jimmy's total weekly salary, in dollars, if he sells x items is given by $S = 100 + 5x$, and Jenny's total weekly salary, in dollars, if she sells x items is given by $S = 80 + 6x$. Assuming that they sell the same number of items in a week, what is the minimum number of items they have to sell so that Jenny's weekly salary is at least \$100 more than Jimmy's?

a. 80
b. 100
c. 120
d. 180

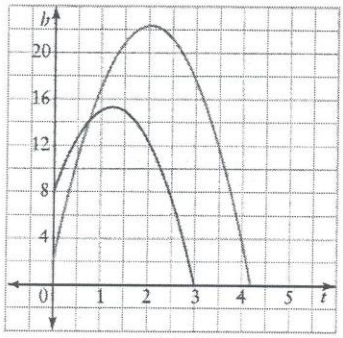
b 48. The A bungee jumper's height, h, in metres, above the ground after t seconds, is shown in the graph.



For approximately how long is the bungee jumper's height above the ground less than 2 m?

a. 1 s
b. 2 s
c. 3 s
d. 4 s

C 49. The heights, h, of two balls, in metres, after t seconds are shown in the graph.



What was the difference in height of the two balls initially?

a. 0 m
b. 3 m
c. 6 m
d. 8 m