name:

1. Suppose $f(x) = \sqrt{x}$ determine if

$$f(8+3) = f(8) + f(3)$$

| A | True | B | False |

2. Suppose $f : \mathbf{U} \to \mathbf{U}$ with

$$f(x) = 4x + 2$$

determine expressions equivalent to

$$f\left(\frac{x}{\beta}\right)$$

A	$\frac{4x}{3\beta} + 2$
B	$-\frac{4x}{3\beta} + 2$
C	$\frac{4x}{\beta} + 2$

3. Suppose $g : \mathbf{U} \to \mathbf{U}$ with

$$g(x) = x^3$$

and $q : \mathbf{U} \to \mathbf{U}$ with

$$q(x) = 4x^2 - 8x$$

determine expression/s equivalent to

$$g(q(-2))$$

| A | 32768 | B | 3132 | C | 0 |

4. Suppose $g : \mathbf{U} \to \mathbf{U}$ with

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

and $q : \mathbf{U} \to \mathbf{U}$ with

$$q(x) = -5x^2 - 8x$$

determine expression/s equivalent to

$$g \circ q(0)$$

| A | 0 | B | -112 | C | none of these |

5. Suppose $f(x) = \frac{1}{\sqrt{x}}$ determine if

$$f(4 + \kappa) = f(4) + f(\kappa)$$

| A | True | B | False |

6. Suppose $q : \mathbf{U} \to \mathbf{U}$ with

$$q(x) = x^2$$

and $g : \mathbf{U} \to \mathbf{U}$ with

$$g(x) = 5x + 1$$

determine expression/s equivalent to

$$q(g(\alpha))$$

A	$5\alpha^2 + 20\alpha + 21$
B	$25\alpha^2 + 10\alpha + 1$
C	none of these

7. Suppose $f(x) = \frac{1}{x}$ determine if

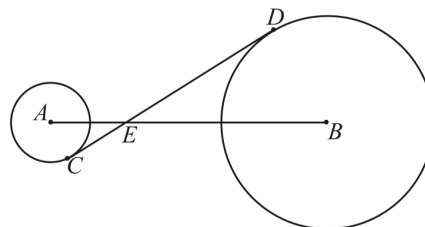$$f(y + \psi) = f(y) + f(\psi)$$

| A | True | B | False |

8.

Circles with centers A and B have radii 4 and 20, respectively. A common internal tangent touches the circles at C and D, as shown. Lines AB and CD intersect at E, and AE=9. What is CD?

| A | 36 | B | 14 | C | 54 | D | $6\sqrt{65}$ | E | none of these |

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9. Suppose $f(x) = \frac{1}{x^2}$ determine if

$$f(6\psi) = 6f(\psi)$$

| A | True | B | False |

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10. Suppose $q : \mathbf{U} \to \mathbf{U}$ with

$$q(x) = \frac{1}{\sqrt{x}}$$

and $f : \mathbf{U} \to \mathbf{U}$ with

$$f(x) = x^3$$

determine expression/s equivalent to

$$q(f(2u))$$

| A | $\frac{1}{(2u+2)^{\frac{3}{2}}}$ |

| B | $\frac{\sqrt{2}}{4\sqrt{u^3}}$ |

| C | none of these |

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11. Suppose $f : \mathbf{U} \to \mathbf{U}$ with

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

Select the true statement/s

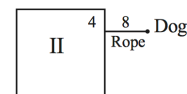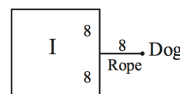| A | $f(0) = 2$ | B | $f(0) = 5$ | C | $f(4) = -2$ |
| D | $f(1) = -5$ |

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12. Suppose $f(x) = \frac{1}{\sqrt{x}}$ determine if

$$f(2 + -8) = f(2) + f(-8)$$

| A | True | B | False |

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13. Suppose we wish to secure a dog with an 8-foot rope to a square shed that is 16 feet on each side. Our preliminary drawings are shown. Which of these arrangements gives the dog the greater area to roam, and by how many square feet?

I: 8, 8, 8 Rope → Dog

II: 4, 8 Rope → Dog

| A | II, by 8π | B | I, by 8π | C | II, by 10π | D | I, by 6π | E | II, by 4π | F | none of these |

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14. Describe the graph of

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

| A | one point | B | the empty set | C | the entire plane |
| D | two lines | E | a circle | F | none of these |

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15. Suppose $q : \mathbf{U} \to \mathbf{U}$ with

$$q(x) = x^3$$

determine expression/s equivalent to

$$\frac{q(x) - q(c)}{x - c}$$

| A | $c^2 + cx + x^2$ | B | $c^2 - cx + x^2$ | C | $-\frac{c^3 - x^3}{c}$ |

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16. Suppose $g : \mathbf{U} \to \mathbf{U}$ with

$$g(x) = x^3$$

and $q : \mathbf{U} \to \mathbf{U}$ with

$$q(x) = e^x$$

determine expression/s equivalent to

$$g\left(q(-5)\right)$$

| A | $e^{(-343)}$ | B | $e^{(-15)}$ | C | $e^{(-64)}$ |

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17. Suppose $f(x) = \sqrt{x}$ determine if

$$f(6 + -9) = f(6) + f(-9)$$

| A | False | B | True |

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18. Suppose $h : \mathbf{U} \to \mathbf{U}$ with

$$h(x) = -2\,x^2 + 2$$
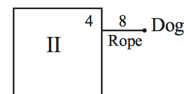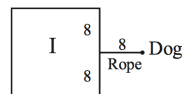
determine expression/s equivalent to

$$h\left(\frac{y+3}{x+2}\right)$$

A	$-\frac{2\,(y-2)^2}{(x-1)^2} + 2$
B	$-\frac{2\,(y+3)^2}{(x+2)^2} + 2$
C	$-\frac{2\,y^2}{(x+4)^2} + 2$

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19. Suppose we wish to secure a dog with an 8-foot rope to a square shed that is 16 feet on each side. Our preliminary drawings are shown. Which of these arrangements gives the dog the greater area to roam, and by how many square feet?

| A | II, by 8 | B | II, by 4 | C | I, by 8 | D | II, by 10 |
| E | I, by 6 | F | none of these |

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20. Suppose $f(x) = 2\,x^2 - 5$ determine if

$$f(\psi \cdot x) = f(\psi) \cdot f(x)$$

| A | False | B | True |

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21. Suppose $f(x) = -x^2 + 8\,x$ determine if

$$f(\kappa \cdot 3) = f(\kappa) \cdot f(3)$$

| A | False | B | True |

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22. Suppose $f(x) = \frac{1}{\sqrt{x}}$ determine if

$$f(u + 7) = f(u) + f(7)$$

| A | False | B | True |

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23. Suppose $p : \mathbf{U} \to \mathbf{U}$ with

$$p(x) = x^3$$

determine expression/s equivalent to

$$\frac{p(x+h) - p(x)}{h}$$

A	$-\frac{27\,h^3 - 27\,h^2 x + 9\,hx^2 - x^3 - 4}{h}$
B	$h^2 + 3\,hx + 3\,x^2$
C	$\frac{h^3 + 3\,h^2 x + 3\,hx^2 + 2\,x^3}{h}$

24. Suppose $h : \mathbf{U} \to \mathbf{U}$ with

$$h(x) = -x^2 - 2$$

determine expression/s equivalent to

$$h\left(G\left(x\right) - 6\right)$$

A	$-\left(G\left(x\right) - 6\right)^2 - 2$
B	$-\left(G\left(x\right) + 6\right)^2 - 2$
C	$-\left(G\left(x\right) + 3\right)^2 - 2$

25. For how many real values of x is $\sqrt{120 - \sqrt{x}}$ an integer?

A	11	B	6	C	9	D	3	E	10	F	none of these

26. Suppose $f\left(x\right) = \frac{1}{x}$ determine if

$$f\left(-4 + -8\right) = f\left(-4\right) + f\left(-8\right)$$

A	False	B	True

27. Let f be a function for which $f\left(-\frac{1}{4}x\right) = x^2 - 3x - 10$. Find the sum of all values of z for which $f\left(-z\right) = -6$

A	-5	B	$\frac{5}{4}$	C	$\frac{3}{4}$	D	-3	E	none of these

28. Let f be a function for which $f\left(-\frac{1}{3}x\right) = x^2 + x + 3$. Find the sum of all values of z for which $f\left(-2z\right) = 9$

A	$-\frac{3}{2}$	B	$\frac{5}{2}$	C	$\frac{1}{2}$	D	$-\frac{5}{6}$	E	$-\frac{1}{6}$
F	none of these								

29. Suppose $f\left(x\right) = \frac{1}{x^2}$ determine if

$$f\left(7 + y\right) = f\left(7\right) + f\left(y\right)$$

A	False	B	True

30. Suppose $g : \mathbf{U} \to \mathbf{U}$ with

$$g(x) = 1$$

determine expressions equivalent to

$$g\left(\alpha + y\right)$$

A	1