

Calculus - SUMMER PACKET

NAME: _____

Summer + Math = (Best Summer Ever)²

NO CALCULATOR!!!

Rewrite the following using rational exponents. Example: $\frac{1}{\sqrt[3]{x^2}} = x^{-\frac{2}{3}}$

19. $\sqrt[5]{x^3} + \sqrt[5]{2x}$

20. $\sqrt{x+1}$

21. $\frac{1}{\sqrt{x+1}}$

22. $\frac{1}{\sqrt{x}} - \frac{2}{x}$

23. $\frac{1}{4x^3} + \frac{1}{2}\sqrt[4]{x^3}$

24. $\frac{1}{4\sqrt{x}} - 2\sqrt{x+1}$

Write each expression in radical form and positive exponents. Example: $x^{\frac{2}{3}} + x^{-2} = \sqrt[3]{x^2} + \frac{1}{x^2}$

25. $x^{\frac{1}{2}} - x^{\frac{3}{2}}$

26. $\frac{1}{2}x^{-\frac{1}{2}} + x^{-1}$

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

28. $(x+4)^{-\frac{1}{2}}$

29. $x^{-2} + x^{\frac{1}{2}}$

30. $2x^{-2} + \frac{3}{2}x^{-1}$

Solve the following equations. Remember $e^0 = 1$ and $\ln 1 = 0$.

46. $e^x + 1 = 2$

47. $3e^x + 5 = 8$

48. $e^{2x} = 1$

49. $\ln x = 0$

50. $3 - \ln x = 3$

51. $\ln(3x) = 0$

52. $x^2 - 3x = 0$

53. $e^x + xe^x = 0$

54. $e^{2x} - e^x = 0$

Solve the following trig equations where $0 \leq x \leq 2\pi$.

55. $\sin x = \frac{1}{2}$

56. $\cos x = -1$

57. $\cos x = \frac{\sqrt{3}}{2}$

58. $2\sin x = -1$

59. $\cos x = \frac{\sqrt{2}}{2}$

60. $\cos\left(\frac{x}{2}\right) = \frac{\sqrt{3}}{2}$

61. $\tan x = 0$

62. $\sin(2x) = 1$

63. $\sin\left(\frac{x}{4}\right) = \frac{\sqrt{3}}{2}$

72. $\ln 1$

73. $\ln e^7$

74. $\log_3 \frac{1}{3}$

75. $\log_{1/2} 8$

76. $\ln \frac{1}{2}$

77. $27^{\frac{2}{3}}$

78. $(5a^{2/3})(4a^{3/2})$

79. $\frac{4xy^{-2}}{12x^{-1/3}y^{-5}}$

80. $(4a^{5/3})^{3/2}$

Calculus Summer Assignment

PROBLEM SET #1 – Slopes

*****Calculators Not Allowed*****

Calculate the slope of the line containing the following points:

1. $(2, 8)$ and $(-4, 6)$

Answer:

6. $(\frac{3}{2}, -4)$ and $(2, 0)$

Answer:

2. $(-4, -7)$ and $(3, 0)$

Answer:

7. $(\frac{11}{14}, \frac{3}{7})$ and $(\frac{9}{14}, \frac{5}{7})$

Answer:

3. $(-3, -6)$ and $(-1, -6)$

Answer:

8. $(\frac{8}{9}, \frac{2}{3})$ and $(\frac{5}{6}, \frac{2}{5})$

Answer:

4. $(4, -2)$ and $(4, 5)$

Answer:

9. $(-4, -3)$ and $(0, -11)$

Answer:

5. $(\frac{4}{5}, 6)$ and $(\frac{3}{5}, 4)$

Answer:

10. $(-\frac{3}{7}, \frac{3}{8})$ and $(-\frac{1}{6}, \frac{5}{6})$

Answer:

PROBLEM SET #2 – Equations of Lines

*****Calculators Not Allowed*****

For each of the following questions, write the equation of the line given the specific information.

1. Passes through (2,3) and $m = 2$

Answer:

2. Passes through (-2,4) and $m = \frac{1}{2}$

Answer:

3. Passes through (-4,-5) and (2,7)

Answer:

4. Passes through (3,-5) and (-3,5)

Answer:

5. Passes through (-1, 2) and $m = 0$

Answer:

6. Passes through (-1, 2) and the slope is undefined.

Answer:

7. Passes through (-2, 2) and is parallel to $2y = 4x - 12$

Answer:

8. Passes through (-3, 2) and is perpendicular to $15y = 10x + 2$

Answer:

9. $m = \frac{3}{5}$ and $b = 0$

Answer:

10. $m = 0$ and $b = -\frac{1}{7}$

Answer:

Problem Set #3 – Functions & Graphing Functions ***Calculators Not Allowed***

1. a) True/False $3x^2 + 5y = 7 - 2x$ is a function.

b) Why or why not? _____

2. a) True/False $2x^2 + 3y^2 = 11$ is a function.

b) Why or why not? _____

3. a) True/False The following table represents a function.

x	-2	-1	0	1	2	5
y	5	3	6	3	2	-4

b) Why or why not? _____

4. a) True/False The following table represents a function.

x	-2	2	0	-2	2	5
y	4	3	6	3	2	-3

b) Why or why not? _____

5. Evaluate $g(2)$ if $g(x) = 3x^2 - 5x + 5$

Answer:

6. Evaluate $g(-3)$ if $g(x) = -x^2 - 2x + 15$

Answer:

7. Evaluate $f(x - 2)$ if $f(x) = -2x^2 - 3x + 11$

Answer:

8. Evaluate $f(5 - x)$ if $f(x) = \frac{4x-3}{2-x}$

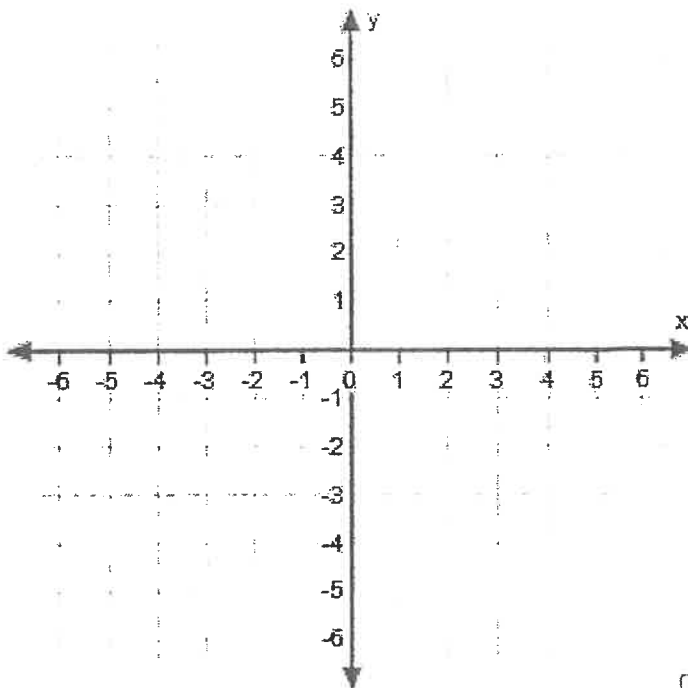
Answer:

Problem Set #4 – Piecewise Functions

*****Calculators Not Allowed*****

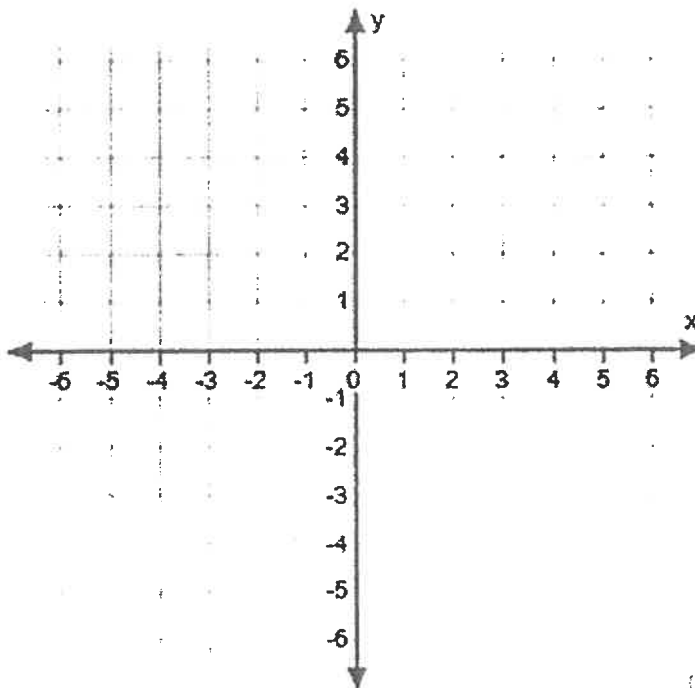
1. Graph the following piecewise function:

$$f(x) = \begin{cases} x - 1 & -5 \leq x < -1 \\ -2 & -1 \leq x < 2 \\ -x + 3 & 2 < x \leq 6 \end{cases}$$



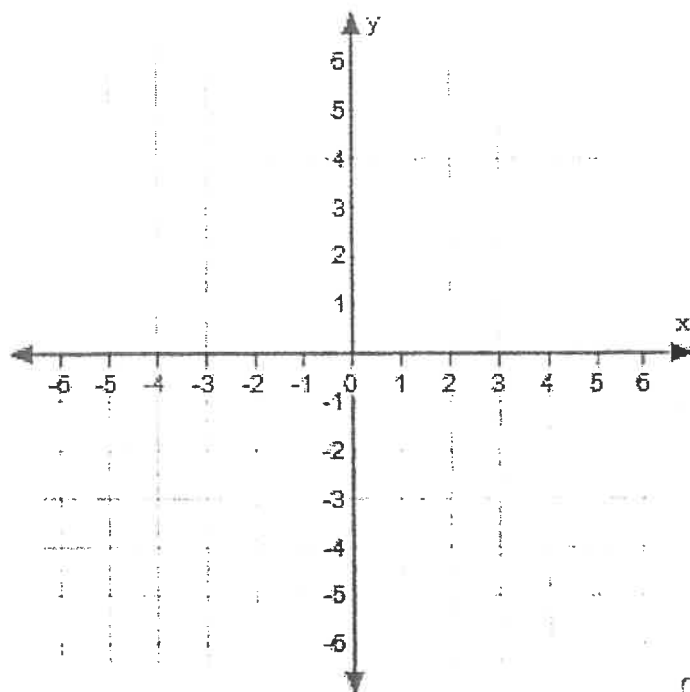
2. Graph the following piecewise function:

$$f(x) = \begin{cases} 2x + 1 & x < 1 \\ -x^2 + 5 & x \geq 1 \end{cases}$$



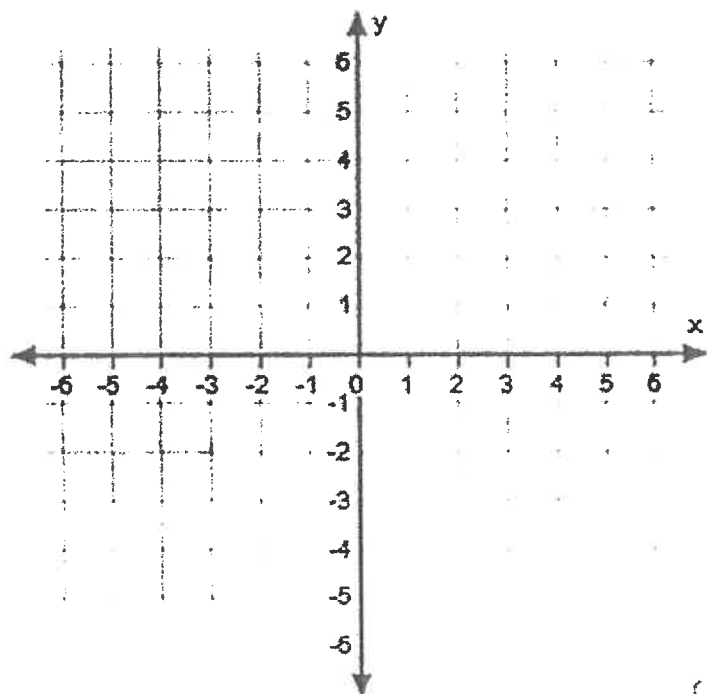
3. Graph the following piecewise function:

$$f(x) = \begin{cases} -2x - 6 & x < -4 \\ x + 4 & -4 \leq x < 2 \\ x^2 - 3 & x \geq 2 \end{cases}$$



4. Graph the following piecewise function:

$$f(x) = \begin{cases} |x + 3| - 1 & -6 \leq x < 1 \\ -x - 2 & x > 1 \end{cases}$$



5. Given:

$$f(x) = \begin{cases} x^2 - 5 & x < -5 \\ 11 & -5 \leq x < 1 \\ -3x^2 + 10 & x \geq 1 \end{cases}$$

a) Find $f(-7)$

Answer:

b) Find $f(-5)$

Answer:

c) Find $f(0)$

Answer:

d) Find $f(1)$

Answer:

e) Find $f(3)$

Answer:

6. Given:

$$f(x) = \begin{cases} |x - 5| + 3 & x < -2 \\ 2x^3 - 4 & x \geq -2 \end{cases}$$

a) Find $f(-5)$

Answer:

b) Find $f(-2)$

Answer:

c) Find $f(0)$

Answer:

d) Find $f(1)$

Answer:

Problem Set #5 – Function Composition

*****Calculators Not Allowed*****

Use the following functions to answer questions 1 – 16.

$$f(x) = 3x$$

$$g(x) = -2x - 1$$

$$h(x) = |x - 3|$$

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

1. $g(f(2)) =$

Answer:

9. $f(k(3)) =$

Answer:

2. $f \circ g(3) =$

Answer:

10. $h \circ f(-7) =$

Answer:

3. $h(f(g(0))) =$

Answer:

11. $k(f(h(-5))) =$

Answer:

4. $k \circ g \circ h(-2) =$

Answer:

12. $h \circ k \circ g(-1) =$

Answer:

5. $g \circ k(x) =$

Answer:

13. $k \circ f(x) =$

Answer:

6. $5f(x) - 3g(x) =$

Answer:

14. $-2g(x) + 4f(x) =$

Answer:

7. $g \circ f \circ k(x) =$

Answer:

15. $g \circ k \circ f(x) =$

Answer:

8. $\frac{f(x)}{g(x)} =$

Answer:

16. $\frac{g(x)}{k(x)} =$

Answer:

Problem Set #6 – Function Roots

*****Calculators Not Allowed*****

Find any real roots, if they exist, for questions 1 – 12.

1. $y = x^2 - 2x - 8$

Answer:

2. $f(x) = x^2 + 4x - 32$

Answer:

3. $r(t) = t^3 - 11t^2 + 18t$

Answer:

4. $y = -3x^2 - 10x + 8$

Answer:

5. $r(t) = t^3 - 5t^2 + 12t$

Answer:

6. $r(t) = t^2 - 6t + 17$

Answer:

7. $y = 2x^2 - x - 10$

Answer:

8. $f(x) = -x^2 + 4x + 12$

Answer:

9. $f(x) = 5x^2 + 5x + 12$

Answer:

10. $y = 3x^2 - 8x - 2$

Answer:

11. $q(z) = 5z^3 + 2z^2 - 7z$

Answer:

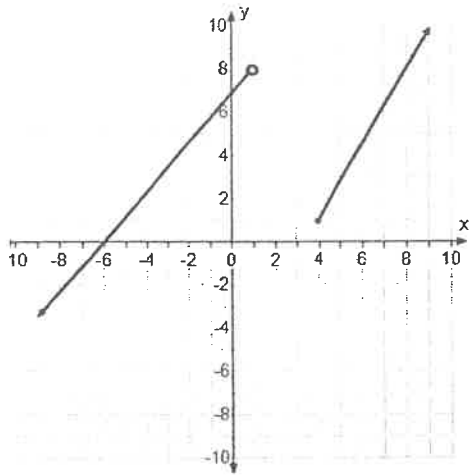
12. $y = 3x^3 + 6x^2 - x$

Answer:

Problem Set #7 – Domain & Range

*****Calculators Not Allowed*****

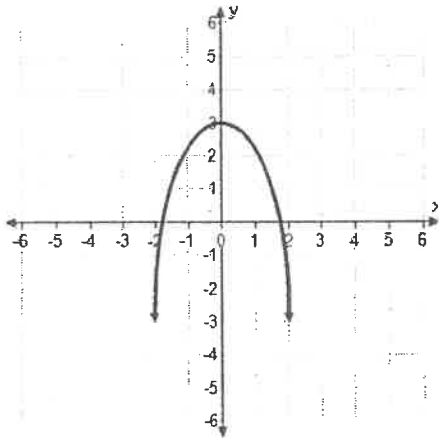
1.



Domain: _____

Range: _____

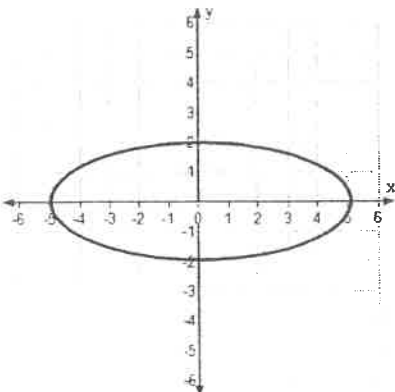
2.



Domain: _____

Range: _____

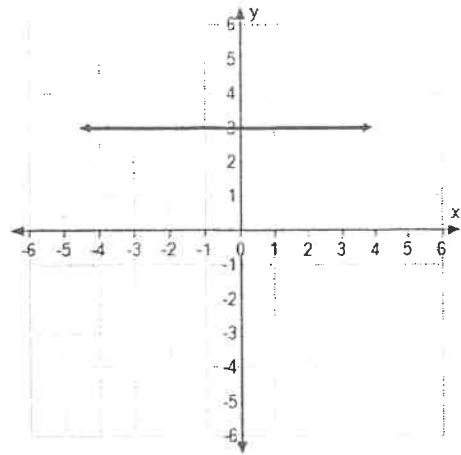
3.



Domain: _____

Range: _____

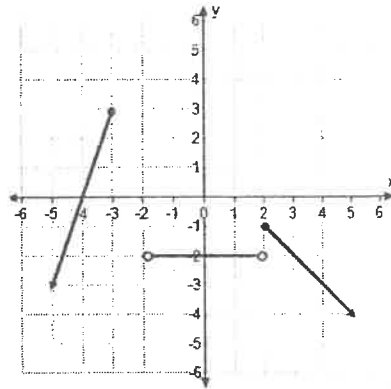
4.



Domain: _____

Range: _____

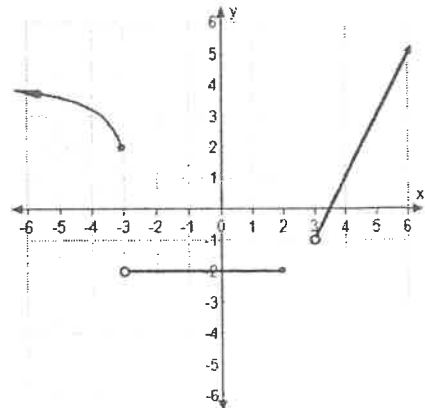
5.



Domain: _____

Range: _____

6.



Domain: _____

Range: _____

7. $y = -2x + 12$

Domain: _____

Range: _____

8. $y = x^2 + 4x - 32$

Domain: _____

Range: _____

9. $y = -3x^2 + 6x + 5$

Domain: _____

Range: _____

10. $y = \sqrt{x + 5} - 2$

Domain: _____

Range: _____

11. $y = -\sqrt{x + 7} + 5$

Domain: _____

Range: _____

12. $y = \frac{5x+2}{\sqrt{x+3}}$

Domain only: _____

13. $y = \ln(x - 3)$

Domain: _____

Range: _____

14. $y = 4 \ln(x + 2) - 1$

Domain: _____

Range: _____

15. $y = -x^3 + 14$

Domain: _____

Range: _____

16. $y = \sqrt[3]{x - 8} + 4$

Domain: _____

Range: _____

17. $y = \frac{2x}{x^2+2x-8}$

Domain: _____

Range: _____

18. $y = \frac{25}{2x^2+5x-3} + 4$

Domain only: _____

Problem Set #8 – Inverses

*****Calculators Not Allowed*****

State whether the following functions are inverses.

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

$$g(x) = 1 + x^2$$

Answer:

2. $g(z) = \frac{3}{z} + 5$

$$f(z) = \frac{3}{z-5}$$

Answer:

3. $g(x) = \sqrt{x - 3} + 5$

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

Answer:

4. $k(t) = 2t^3 - 1$

$$m(t) = \frac{\sqrt[3]{t+1}}{2}$$

Answer:

Find the inverse of each function.

5. $h(x) = 4\sqrt[3]{x} + 2$

Answer:

6. $k(t) = -5t + 11$

Answer:

7. $m(x) = 7x^2 - 4$

Answer:

8. $g(z) = (z - 3)^5 + 2$

Answer:

Problem Set #9 – Trigonometry

*****Calculators Not Allowed*****

Evaluate each of the following.

1. $\csc \frac{7\pi}{6}$

Answer:

2. $\tan \frac{\pi}{3}$

Answer:

3. $\sin \frac{7\pi}{4}$

Answer:

4. $\sec \frac{\pi}{6}$

Answer:

5. $\cot \pi$

Answer:

6. $\csc \frac{\pi}{4}$

Answer:

7. $\sin \frac{\pi}{2}$

Answer:

8. $\cos \frac{5\pi}{3}$

Answer:

9. $\csc \frac{14\pi}{6}$

Answer:

10. $\tan \frac{2\pi}{3}$

Answer:

11. $\csc \frac{15\pi}{4}$

Answer:

12. $\cot \frac{2\pi}{4}$

Answer:

13. $\sin \frac{4\pi}{3}$

Answer:

14. $\csc \frac{4\pi}{3}$

Answer:

15. $\cos \frac{11\pi}{6}$

Answer:

16. $\cot \frac{4\pi}{3}$

Answer:

17. $\tan \frac{\pi}{2}$

Answer:

18. $\cot \frac{5\pi}{4}$

Answer:

19. $\csc \frac{3\pi}{4}$

Answer:

20. $\cos \frac{5\pi}{2}$

Answer:

Evaluate:

21. $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

Answer:

22. $\sin^{-1}(0)$

Answer:

23. $\csc^{-1}\left(\frac{2\sqrt{3}}{3}\right)$

Answer:

24. $\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$

Answer:

25. $\sin^{-1}(1)$

Answer:

26. $\cos^{-1}(0)$

Answer:

27. $3 + 2 \cos^2\left(\frac{3\pi}{2}\right)$

Answer:

28. $\cot^{-1}(-1)$

Answer:

29. $\sec^{-1}(\sqrt{2})$

Answer:

30. $2 - 3 \sin^2\left(\frac{\pi}{2}\right)$

Answer:

31. $\cos^{-1}\left(-\frac{1}{2}\right)$

Answer:

32. $\csc^{-1}(1)$

Answer:

Problem Set #10 – Exponents

*****Calculators Not Allowed*****

Simplify:

1. $\frac{15m^{11}k^{-5}}{10m^4k^{-12}}$

Answer:

2. $\frac{21e^3f^{14}}{42e^7f^{-3}}$

Answer:

3. $(3x^2 - 5x + 2)(x^2 + 3x - 1)$

Answer:

4. $(2y^3 + 3y^2 - 4)(y^2 + 7y - 3)$

Answer:

5. $\left(\frac{(2a^4b^2)^3}{(4a^9b^{-5})^2}\right)^{-3}$

Answer:

6. $\left(\frac{(3m^3n^4)^4}{(6m^{-8}n^{12})^2}\right)^{-2}$

Answer:

7. $(-5x^3y^{-6}z^4)^{-3}$

Answer:

8. $(4m^{-2}k^4p)^{-2}$

Answer:

9. $(2x^3y^3z)^2(15x^{10}y^4z^0)$

Answer:

10. $(-5r^5s^{-2}t^4)^2(3rs^5t^2)$

Answer:

11. $(5a - 2b)^2$

Answer:

12. $(c - 4)^3$

Answer:

Problem Set #11 – Logarithms

Calculators Allowed

Solve the following equations:

1. $\log_x 16 = 4$

Answer:

2. $\log_x 125 = 3$

Answer:

3. $3^{3x+2} = 108$

Answer:

4. $2^{4x-3} = 12$

Answer:

5. $\log(7x + 3) = \log(2x + 23)$

Answer:

6. $\log(2x + 3) = \log(12x - 1)$

Answer:

7. $5^{3x} = 2^6$

Answer:

8. $4^{2x} = 5^4$

Answer:

9. $\log_2(r + 3) + \log_2(r) = \log_2 10$

Answer:

10. $\log_4(r + 5) - \log_4(r) = \log_4 10$

Answer:

