Solving Station 1

1. $8^{3x} = \left(\frac{1}{16}\right)^{x-1}$

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

3. $2^{x+3} = 3^{2x+1}$

Answers

14. $2, \log_2\left(\frac{2}{3}\right)$

15. $\ln 5$

16. $\log_4 3$

Solving Station 2

4. $\ln 2 + \ln x + \ln(x-3) = \ln(x-6)$

5. $4 - 2e^{3x+1} = -6$

6. $\log_3(2-x) - \log_3 x = \log_3 27$

Answers

1. $\frac{4}{13}$

2. 101

3. $\frac{3\ln 2 - \ln 3}{2\ln 3 - \ln 2}$

Graphs & Inverses 3

7. Explain the transformations in the order you would perform them.

A. $f(x) = 5 - e^{4-x}$

B. $f(x) = 2 + \log_3(x-7)$

C. $f(x) = 4^{x+2} - 3$

8. Write the inverse function.

A. $f(x) = 2 - \ln(x+1)$

B. $f(x) = 1 + 4^{x-2}$

Answers

4. No solution

5. $\frac{-1+\ln 5}{3}$

6. $\frac{1}{14}$

Problem Solving 5

11. An investment of $1100 is placed into an account earning 3.14% interest compounded continuously. How long for the money to double?

12. An account earning 13.1% interest compounded weekly contains $7150. After 4 years, how much money is there?

13. Determine the value of an investment yielding $10,160 after 12 years of investing at 7.35% continuous interest.

Answers

9. 29.6 years

10. K = -.1733, t = 3.3 days

The Fun Ones 6

14. $3 \cdot 2^{2x} - 14 \cdot 2^{x} + 8 = 0$

15. $e^{2x} - e^{x} - 20 = 0$

16. $4^{2x} - 2 \cdot 4^{x} - 3 = 0$

Answers

11. 22.1 yrs
12. $120666.70
13. $4205.77

1. $(2^3)^{3x} = (2^{-4})^{x-1}$

$9x = -4x + 4$

$13x = 4$

$\boxed{x = \frac{4}{13}}$

2. $\log(x-1) = 2$

$10^2 = x - 1$

$100 = x - 1$

$\boxed{x = 101}$

3. $\ln 2(x+3) = \ln 3(2x+1)$

$x\ln 2 + 3\ln 2 = 2x\ln 3 + \ln 3$

$3\ln 2 - \ln 3 = 2x\ln 3 - x\ln 2$

$3\ln 2 - \ln 3 = x(2\ln 3 - \ln 2)$

$\boxed{x = \frac{3\ln 2 - \ln 3}{2\ln 3 - \ln 2}}$

4. $\ln 2 + \ln x + \ln(x-3) = \ln(x-6)$

$\ln[2x(x-3)] = \ln(x-6)$

$2x^2 - 6x = x - 6$

$2x^2 - 7x + 6 = 0$

$(2x-4)(2x-3) = 0$

$(x-2)(2x-3) = 0$

$x = 2 \quad x = \frac{3}{2}$

No solution

5. $-2e^{3x+1} = -10$

$e^{3x+1} = 5$

$(3x+1)\ln e = \ln 5$

$3x+1 = \ln 5$

$3x = -1 + \ln 5$

$x = \frac{-1+\ln 5}{3}$

6. $\log_3\left(\frac{2-x}{x}\right) = \log_3 27$

$2 - x = 27x$

$2 = 28x$

$x = \frac{1}{14}$

7. A) x-refl, y-refl, right 4, up 5

B) up 2, right 7

C) down 3, left 2

8. A) $x = 2 - \ln(y+1)$

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

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

$e^{2-x} = e^{\ln(y+1)}$

$e^{2-x} = y+1$

$y = -1 + e^{2-x}$

$\boxed{f^{-1}(x) = -1 + e^{2-x}}$

B) $x = 1 + 4^{y-2}$

$x - 1 = 4^{y-2}$

$\log_4(x-1) = \log_4 4^{y-2}$

$\log_4(x-1) = y - 2$

$2 + \log_4(x-1) = y$

$\boxed{f^{-1}(x) = 2 + \log_4(x-1)}$

9. $y = a(1 \pm r)^t$

$1200000 = 500000(1+.03)^t$

$\frac{12}{5} = 1.03^t$

$\ln\left(\frac{12}{5}\right) = t \ln(1.03)$

$t = \frac{\ln(12/5)}{\ln(1.03)}$

$\boxed{t = 29.6 \text{ yrs}}$

10. $y = ce^{kt}$

$1 = 2e^{k(4)}$

$\frac{1}{2} = e^{4k}$

$\ln(\frac{1}{2}) = \ln e^{4k}$

$\ln(\frac{1}{2}) = 4k$

$k = \frac{\ln(\frac{1}{2})}{4}$

$k = -.1733$

$y = ce^{-.1733t}$

$1.7 = 3e^{-.1733t}$

$\frac{1.7}{3} = e^{-.1733t}$

$\ln(1.7/3) = -.1733t$

$t = 3.3 \text{ days}$

11. $A = Pe^{rt}$

$2200 = 1100e^{.0314t}$

$2 = e^{.0314t}$

$\ln 2 = .0314t$

$t = \frac{\ln 2}{.0314}$

$t = 22.1 \text{ yrs}$

12. $A = P(1 + \frac{r}{n})^{nt}$

$A = 7150(1 + \frac{.131}{52})^{52(4)}$

$A = \$12066.70$

13. $10160 = Pe^{.0735(12)}$

$P = \frac{10160}{e^{(.0735 \times 12)}}$

$P = \$4205.77$

14. $(3 \cdot 2^x - 12)(3 \cdot 2^x - 2) = 0$

$(2^x - 4)(3 \cdot 2^x - 2) = 0$

$2^x = 4 \qquad 2^x = \frac{2}{3}$

$\log_2 2^x = \log_2 4 \qquad \log_2 2^x = \log_2 \frac{2}{3}$

$x = 2 \qquad x = \log_2(\frac{2}{3})$

15. $(e^x-5)(e^x+4)=0$

$e^x=5$ ~~$e^x=-4$~~

$\boxed{x=\ln 5}$

16. $1\cdot 4^{2x}-2\cdot 4^x-3=0$

$(4^x-3)(4^x+1)=0$

~~$4^x=-1$~~

$4^x=3$

$\log_4 4^x=\log_4 3$

$\boxed{x=\log_4 3}$