

Bell Work Wednesday 12/19

Grab a calculator

- If you invest 10,000 with 7% interest rate compounded monthly, how long will it take until your balance is 25,000.

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

$$25000 = 10000(1 + \frac{0.07}{12})^{12t}$$

$$t = 13.128$$

3 years 1.5 months
We cannot round down

In Exercises 1–10, find the exact solution algebraically, and check it by substituting into the original equation.

- $36(\frac{1}{3})^{x/5} = 4$
- $32(\frac{1}{4})^{x/3} = 2$
- $2 \cdot 5^{x/4} = 250$
- $3 \cdot 4^{x/2} = 96$
- $2(10^{-x/3}) = 20$
- $3(5^{-x/4}) = 15$
- $\log x = 4$
- $\log_2 x = 5$
- $\log_4(x-5) = -1$
- $\log_4(1-x) = 1$

$$36(\frac{1}{3})^{x/5} = 4$$

$$\frac{36}{36} = \frac{4}{36}$$

$$(\frac{1}{3})^{x/5} = \frac{1}{9}$$

$$(\frac{1}{3})^{x/5} = (\frac{1}{3})^2$$

$$x/5 = 2$$

$$x = 10$$

1-6 → exponential
7-10
↓ log restrictions
input cannot be - or 0
must have + input

$$x/5 = 2 \quad x = 10$$

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$$3. \frac{2 \cdot 5^{x/4}}{2} = \frac{250}{2}$$

$$5^{x/4} = 125$$

$$5^{x/4} = 5^3$$

$$x/4 = 3$$

$$x = 12$$

$$4. \frac{3 \cdot 4^{x/2}}{3} = \frac{96}{3}$$

$$4^{x/2} = 32$$

$$(2^2)^{x/2} = 2^5$$

$$2^x = 2^5$$

$$x = 5$$

$$6. \frac{3(5)^{-x/4}}{3} = \frac{1}{5}$$

$$5^{-x/4} = \frac{1}{5}$$

$$5^{-x/4} = 5^{-1}$$

$$-x/4 = -1$$

$$x = 4$$

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$$\log x = 4$$

$$x = 10^4$$

$$8. \log_2(x-5) = -1$$

$$x-5 = 2^{-1}$$

$$x-5 = \frac{1}{2}$$

$$x = \frac{1}{2} + 5 = 5\frac{1}{2}$$

$$9. \log_4(x-5) = -1$$

$$4^{-1} = x-5$$

$$\frac{1}{4} + 5 = x$$

$$x = 5\frac{1}{4}$$

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

$$1-x = 10^1$$

$$x = -9$$

38. solve each equation by the method of your choice. Use the method of your choice.

- $e^{4x} = x^2$
- $\log x = 6$
- $\frac{2^x + 2^{-x}}{2} = 3$
- $2e^{2x} + 5e^x - 3 = 0$
- $\frac{400}{1 + 95e^{-0.6x}} = 150$

$$+3) - \ln x = 0$$

$$\frac{1}{2} \log(x+4) = 1$$

$$3) + \ln(x+4) = 3 \ln 2$$

$$-2) + \log(x+5) = 2 \log 3$$

$$\log x = 2$$

$$4 \sqrt{x^4} = 10^2$$

$$x = \pm 10^{1/2}$$

$$x = \pm \sqrt{10}$$

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In Exercises 25–38, solve each equation by the method of your choice. Support your solution by a second method.

- $\log x^2 = 6$
- $\ln x^2 = 4$
- $\log x^4 = 2$
- $\ln x^6 = 12$
- $\frac{2^x - 2^{-x}}{3} = 4$
- $\frac{2^x + 2^{-x}}{2} = 3$
- $\frac{e^x + e^{-x}}{2} = 4$
- $2e^{2x} + 5e^x - 3 = 0$
- $\frac{500}{1 + 25e^{0.3x}} = 200$
- $\frac{400}{1 + 95e^{-0.6x}} = 150$
- $\frac{1}{2} \ln(x+3) - \ln x = 0$
- $\log x - \frac{1}{2} \log(x+4) = 1$
- $\ln(x-3) + \ln(x+4) = 3 \ln 2$
- $\log(x-2) + \log(x+5) = 2 \log 3$

$$35. \frac{1}{2} \ln(x+3) = \ln(x) = 0 \leftarrow \ln 1$$

$$\ln(x+3)^{1/2} = \ln 1$$

$$\frac{(x+3)^{1/2}}{x} = 1$$

$$(x+3)^{1/2} = x$$

$$x+3 = x^2$$

$$-x-3 = -x^2$$

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

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In Exercises 25–38, solve each equation by the method of your choice.
Support your solution by a second method.

25. $\log x^2 = 6$
26. $\ln x^2 = 4$

27. $\log x^4 = 2$ **28.** $\ln x^6 = 12$

29. $\frac{2^x - 2^{-x}}{3} = 4$ **30.** $\frac{2^x + 2^{-x}}{2} = 3$

31. $\frac{e^x + e^{-x}}{2} = 4$ **32.** $2e^{2x} + 5e^x - 3 = 0$

33. $\frac{500}{1 + 25e^{0.3x}} = 200$ **34.** $\frac{400}{1 + 95e^{-0.6x}} = 150$

35. $\frac{1}{2} \ln (x + 3) - \ln x = 0$

36. $\log x - \frac{1}{2} \log (x + 4) = 1$

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

38. $\log (x - 2) + \log (x + 5) = 2 \log 3$

