

Sec 4.4.2 Solving Exponential Equations

Solve-

$$10^x = 8.07$$

$$\log 10^x = \log 8.07$$

$$x \log 10 = \log 8.07$$

$$x = \log 8.07$$
$$\approx .906$$

$$e^x = .83$$

$$\ln e^x = \ln .83$$

$$x \ln e = \ln .83$$

$$x = \ln .83$$

$$\approx -.186$$

-steps-
*isolate base

*log/ln \leftarrow
both sides

*expand

*solve
resulting
equation

$$e^{4x-5} - 7 = 11,243$$

$$\ln e^{4x-5} = \ln 11250$$

$$(4x-5) \ln e = \ln 11250$$

$$x \approx 3.58$$

$$\begin{array}{r} 9.32 \\ + 5 \\ \hline 4 \end{array}$$

$$7^{2x+1} = 3^{x+2}$$

$$\log 7^{2x+1} = \log 3^{x+2}$$

$$(2x+1) \log 7 = (x+2) \log 3$$

$$1.69x + .845 = .477x + .954$$

$$1.213x = .109$$

$$x \approx .089$$

$$e^{2x} - 2e^x - 3 = 0 \quad (e^x)^2 - 2e^x - 3$$

Use "u" substitution

Let $u = e^x$

$$u^2 - 2u - 3 = 0$$

$$(u - 3)(u + 1) = 0$$

$$u = 3 \text{ \& } u = -1$$

reverse your substitution-

$$3 = e^x$$

$$\ln 3 = \ln e^x$$

$$\ln 3 = x$$

$$\ln 3 \approx x$$

~~$$-1 = e^x$$~~

~~$$\ln -1 = \ln e^x$$~~

~~$$\ln -1 = x$$~~

$$e^{4x} - 3e^{2x} - 18 = 0$$

Rewrite-

$$(e^{2x})^2 - 3e^{2x} - 18 = 0$$

So, let $u = e^{2x}$

$$u^2 - 3u - 18 = 0$$

$$(u-6)(u+3) = 0$$

$$u = 6 \text{ or } -3$$

$$\ln 6 = \ln e^{2x} \quad \ln -3 = \ln 2^x$$

$$\ln 6 = 2x$$

$$x \approx 0.895$$

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

$$2^{2x} + 2^x - 12 = 0$$

Rewrite-

$$(2^x)^2 + 2^x - 12 = 0$$

Let $u = 2^x$

$$u^2 + u - 12 = 0$$

$$(u+4)(u-3) = 0$$

$$u = -4 \text{ \& \; } 3$$

$$3 = 2^x$$

$$\ln 3 = \ln 2^x$$

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

$$x \approx 1.58$$

Suggested Practice
Sec 4.4 page 490
23-47
odds

23. .59

31. 1.3

39. 11.48

25. 1.74

33. -1.14

41. -2.8

27. 1.76

35. 2.45

43. .69

29. 1.53

37. 1.09

45. .55

47. 0

