Logarithmic Equations – Practice (and solutions)

Logarithmic equations can sometimes be solved by exploiting the one to one property of logarithmic functions. That is this = that which can be used with logs log(this)=log(that).

For example, if $\log_4 x = \log_4 5$ then x=5.

Solve each of the following equations involving logarithmic functions. Note you may first have to apply other properties of logarithms.

1. $\log_3(3x-2) = 2$
2. $\log_5(x^2+x+4) = 2$
3. $\log_4 x + \log_4(x-3) = 1$
4. $2\log_3(4+x) - \log_3 9 = 2$
5. $2\log_5 x = 3\log_5 4$
6. $\frac{1}{2}\log_3 x = 2\log_3 2$
7. $\log_3(x-1)^2 = 2$
8. $\log_x 4 = 2$
9. $\log_2(3x+2) - \log_4 x = 3$ (*Hint:* Use the change-of-base formula)
10. $\log_a(x-1) - \log_a(x+6) = \log_a(x-2) - \log_a(x+3)$

<u>Answers</u>:

1) $x = \frac{11}{3}$

2) $x = \frac{-1 \pm \sqrt{85}}{2}$

3) $x = 4$

4) $x = 5$

5) $x = 8$

6) $x = 2$

7) $x = -2,\ 4$

8) $x = 2$

9) $x = \frac{26 \pm 8\sqrt{10}}{9}$

10) $x = \frac{9}{2}$