Topic: Solving Quadratic Equations

## \# homework check: none

## \# note: Solving Quadratic Equations

Recall that a quadratic equation has the form $\mathrm{Ax}^{2}+\mathrm{Bx}+\mathrm{C}=0$. By factoring, we find the $x$ intercepts of the quadratic function. These $x$ intercepts can also be called the roots of the equation. The words root or solution of an equation have the same meaning and can be interchanged at any time. Once we factor the expression, to solve, we set each factor to zero. For example,
a) $x^{2}+3 x-18=0$
$(x+6)(x-3)=0$
$x+6=0 \quad x-3=0$
$x=-6 \quad x=3$
b) $5 x^{2}-21 x-20=0$
$(5 x+4)(x-5)=0$
$5 x+4=0 \quad x-5=0$
$x=\frac{-4}{5} \quad x=5$
It is important to note that in order to solve, everything must be on the same side and in standard form. For example,
c) $2 x^{2}-5 x+1=4$
d) $3 x^{2}-6 x+2=2$
$2 x^{2}-5 x-3=0$
$3 x^{2}-6 x=0$
$(2 x+1)(x-3)=0$
$3 x(x-2)=0$
$2 x+1=0 \quad x-3=0$
$3 x=0$
$x-2=0$
$x=\frac{-1}{2} \quad x=3$
$x=0 \quad x=2$

In some cases, you might be given a problem where you are expected to find the intersection between two functions. In this case, you are looking for the $x$ value that is shared by both, also known as the point of intersection(s). For example, find the points of intersection between the given functions.

$$
\begin{aligned}
& y=2 x-12 \\
& y=x^{2}-2 x-24
\end{aligned}
$$

set them equal to one another

$$
\begin{array}{lr}
2 x-12=x^{2}-2 x-24 & \\
0=x^{2}-4 x-12 & \\
0=(x-6)(x+2) & \\
x-6=0 & x+2=0 \\
x=6 & x=-2
\end{array}
$$

Therefore, these values of $x$ yield points of intersection with corresponding $y$ values we can find by substituting.

$$
\begin{array}{ll}
y=2 x-12 & y=2 x-12 \\
y=2(6)-12 & y=2(-2)-12 \\
y=0 & y=-16 \\
P O I=(6,2) & P O I=(-2,-16)
\end{array}
$$

\# homework assignment: Principles of Mathematics 10 p. 320 \# 3-9 LHC, \#11, 13

