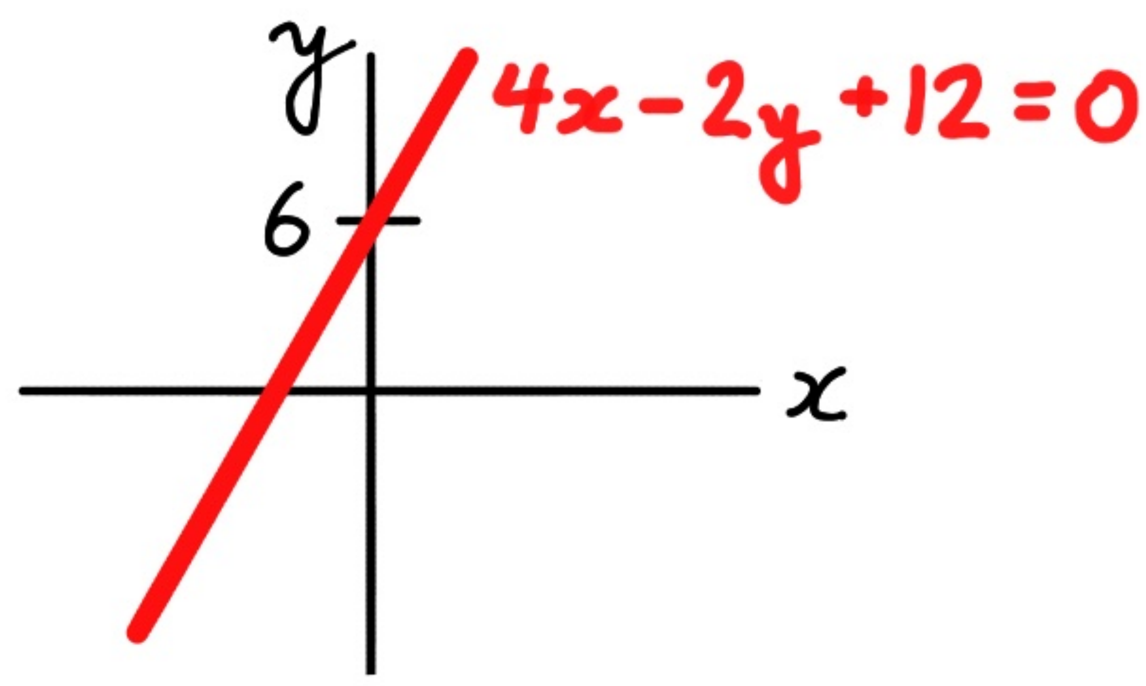
Solutions to MATH 980 Sample Problems

- To simplify $\frac{2}{3}\left(\frac{3}{4}-\frac{1}{2}\right)$, note that $\frac{1}{2}=\frac{2}{4}$, so

$$\frac{2}{3}\left(\frac{3}{4}-\frac{1}{2}\right)=\frac{2}{3}\left(\frac{3}{4}-\frac{2}{4}\right)=\frac{2}{3}\left(\frac{1}{4}\right)=\frac{2}{12}.$$

- To graph $4x-2y+12=0$, first we can solve for y: $4x+12=2y$ and $y=\frac{4x+12}{2}=2x+6$. This is an equation of a line with slope 2 and a y-intercept of 6.



- To solve for x in $9xy+z=3w$, first subtract z, then divide by $9y$:

$$x=\frac{3w-z}{9y}.$$

- To solve $-14<-3x+1\leq 7$, first subtract 1:

$$-15<-3x\leq 6.$$

Second, divide by -3, remembering that dividing by a negative number "flips" the inequality:

$$-2\leq x<5.$$

Solutions to MATH 1010 Sample Problems

- To solve $5x^2-2(x-1)=4x^2+6x-13$ for x:

  Distributive law: $5x^2-2x+2=4x^2+6x-13.$

  Subtract $4x^2+6x-13$: $x^2-8x+15=0.$

  Quadratic Formula:

  $$x=\frac{8\pm\sqrt{8^2-4(15)}}{2}=\frac{8\pm\sqrt{4}}{2}=4\pm1.$$

  So: $x=5$ or $x=3$.

- To solve $2^{(x+7)}=8$ for x, note that

  $x+7=\log_2\left(2^{(x+7)}\right)=\log_2(8)=\log_2(2^3)=3.$

  Subtract 7, to find that $x=3-7=-4.$

- For the system of equations $-3x+y=-1$ and $x+y=7$, we can solve the second equation for x: $x=7-y$. Next, substitute this value for x into the first equation: $-3(7-y)+y=-1$, which simplifies to $-21+4y=-1$. Hence, $4y=20$, so $y=5$. Since, $x=7-y$, we have that $x=2$.

Solutions to MATH 1050 Sample Problems

- To solve for x in $f(3x-7)=2$, apply the inverse function to see that $3x-7=f^{-1}(2)$. Since we were told that $f^{-1}(2)=11$, we have $3x-7=11$, so $3x=18$, and $x=6$.

- To solve for x in $\log_3(x)+\log_3(x-2)=1$, recall that

  $$\log_3(x)+\log_3(x-2)=\log_3(x(x-2))=\log_3(x^2-2x)$$

  so $\log_3(x^2-2x)=1$, and thus, $x^2-2x=3^1=3$. Hence, $x^2-2x-3=0$. By the quadratic formula, $x=3$ or $x=-1$.

  Notice that $x=-1$ can not be a solution to our original equation, since if $x=-1$, then $\log_3(x-2)=\log_3(-3)$ and we can never take a logarithm of a negative number. Therefore, $x=3$ is the only solution.

Solutions to MATH 1050 Sample Problems

- To find the roots of x^3-2x^2-3x+6, we know from the hint that 2 is a root, so $x-2$ divides x^3-2x^2-3x+6.

  Using long division,

$$
\begin{array}{r|l}
 & x^2 - 3 \\
\cline{2-2}
x-2 & x^3-2x^2-3x+6 \\
 & \underline{x^3-2x^2} \\
 & -3x+6 \\
 & \underline{-3x+6} \\
 & 0
\end{array}
$$

  That is, $(x-2)(x^2-3)=x^3-2x^2-3x+6$.

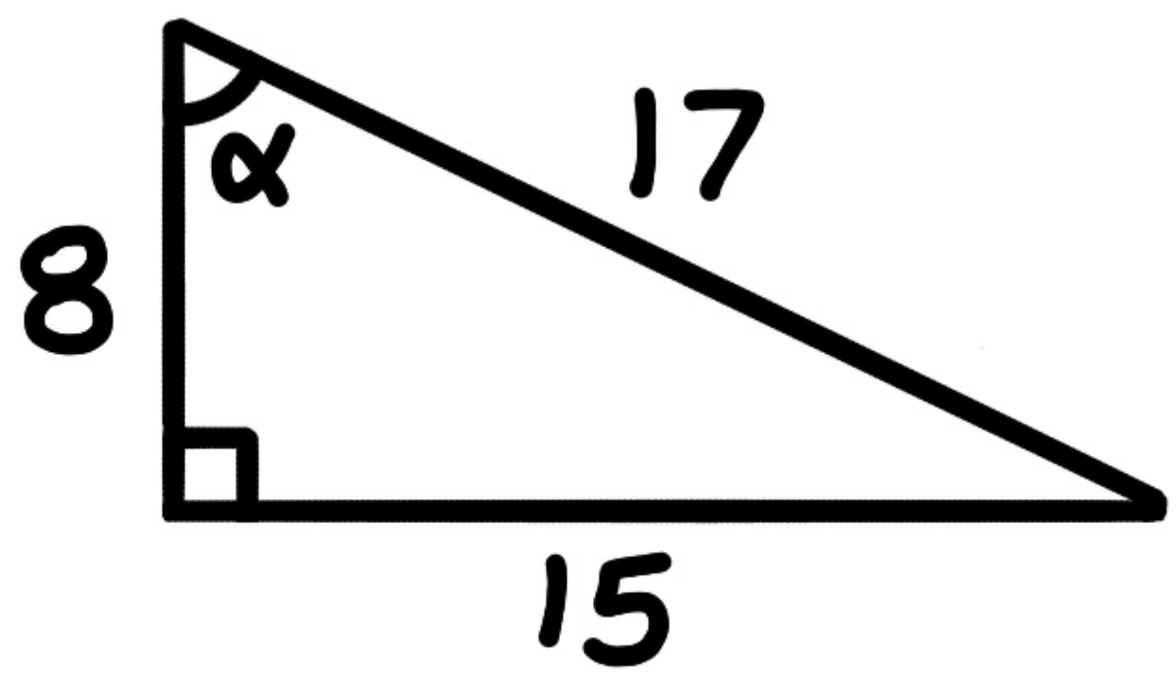
  The root of $(x-2)$ is 2.

  The roots of x^2-3 are $\sqrt{3}$ and $-\sqrt{3}$.

  Therefore, the roots of x^3-2x^2-3x+6 are 2, $\sqrt{3}$, and $-\sqrt{3}$.

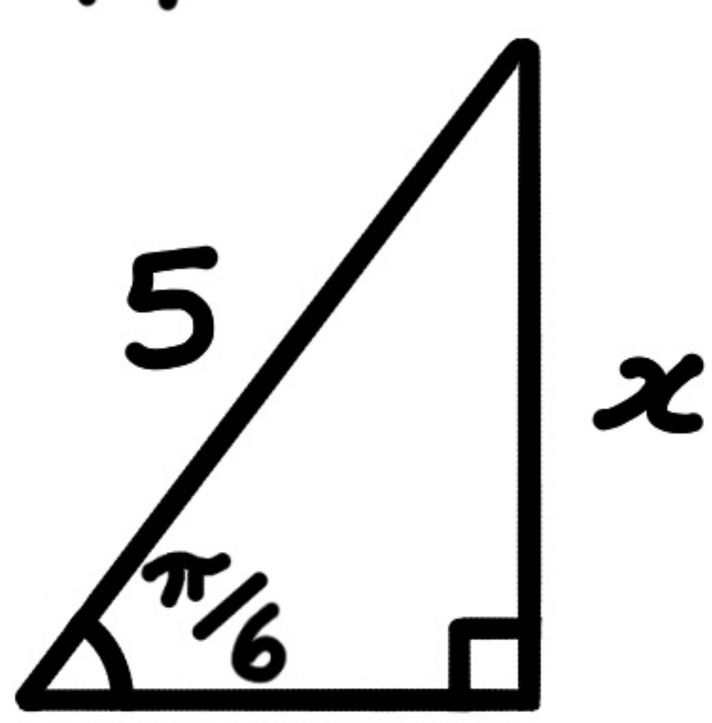
Solutions to MATH 1060 Sample Problems

- Tangent is opposite divided by adjacent, so



tells us $\tan(\alpha) = \frac{15}{8}$.

- Sine is opposite divided by hypotenuse, so



tells us $\sin(\pi/6) = \frac{x}{5}$. Thus,

$$x = 5\sin(\pi/6) = 5 \cdot \frac{1}{2} = \frac{5}{2}.$$

- $\sin^2\theta + \cos^2\theta = 1.$

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