1. Simplify the following:

\[(2\sqrt{2})^2 = \boxed{\phantom{0}}\]

\[(3\sqrt{3})^3 = \boxed{\phantom{0}}\]

\[(1 - \sqrt{2})^2 = \boxed{\phantom{0}}\]

\[(1 - \sqrt{2})(1 + \sqrt{2}) = \boxed{\phantom{0}}\]

\[\frac{1 - \sqrt{2}}{1 + \sqrt{2}} = \boxed{\phantom{0}}\]

\[\left(\frac{\sqrt{5} - 1}{2}\right)\left(\frac{\sqrt{5} + 1}{2}\right) = \boxed{\phantom{0}}\]

\[\left(\frac{\sqrt{5} - 1}{2}\right)^{-1} = \boxed{\phantom{0}}\]

\[\left(\frac{\sqrt{5} + 1}{2}\right)^{-1} = \boxed{\phantom{0}}\]

\[\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} = \boxed{\phantom{0}}\]
2. (a) Find the equation of the line with slope $\frac{1}{3}$ passing through $(2, 6)$.

Solution:

(b) Find the equation of the line passing through $(-1, 6)$ and $(2, -3)$.

Solution:

c) Find the y-intercept of the line passing through $(3, 4)$ and $(-5, -7)$.

Solution:
3. (a) Convert the following angles to radians:

$90^\circ = \square$, $45^\circ = \square$

$135^\circ = \square$, $180^\circ = \square$

$225^\circ = \square$, $420^\circ = \square$

(b) Convert the following angles to degrees:

$\frac{\pi}{3} = \square^\circ$, $\frac{\pi}{6} = \square^\circ$

$\frac{5\pi}{3} = \square^\circ$, $\frac{5\pi}{6} = \square^\circ$

$5\pi = \square^\circ$, $\frac{2\pi}{5} = \square^\circ$
4. Complete the following:

\[ \sin \frac{\pi}{4} = \cos \frac{\pi}{4} = \square \]

\[ \tan \left( \frac{\pi}{4} \right) = \square, \quad \tan \left( \frac{3\pi}{4} \right) = \square, \quad \tan \left( \frac{5\pi}{4} \right) = \square \]

\[ \tan^{-1} (1) = \square, \quad \tan^{-1} (-1) = \square \]

\[ \sin \frac{\pi}{6} = \cos \frac{\pi}{3} = \square \]

\[ \cos \frac{\pi}{6} = \sin \frac{\pi}{3} = \square \]

\[ \tan \left( \frac{\pi}{6} \right) = \square, \quad \tan \left( \frac{\pi}{3} \right) = \square, \quad \tan \left( \frac{5\pi}{6} \right) = \square \]

\[ \tan \left( \frac{5\pi}{3} \right) = \square, \quad \tan^{-1} \left( \sqrt{3} \right) = \square \]

\[ \tan^{-1} \left( \frac{1}{\sqrt{3}} \right) = \square, \quad \tan^{-1} \left( -\frac{1}{\sqrt{3}} \right) = \square \]
5. Factorise the following quadratics:

\[ x^2 + 5x + 4 = \]

\[ x^2 - 5x + 4 = \]

\[ x^2 - 3x - 4 = \]

\[ x^2 + 3x - 4 = \]

Use the quadratic formula to solve the equation \( x^2 + x - 1 = 0 \):

\[ x = \]

and hence factorise the quadratic

\[ x^2 + x - 1 = \]
6. Consider the following triangle:

Use Pythagoras to obtain an equation involving \( x \):

Simplify and solve for \( x \):

Find the length of the hypotenuse of the triangle:
7. Solve for \( x \) given

\[
\frac{1}{x+1} + \frac{1}{x-2} = 4
\]

Solution:
8. Use natural logarithms to solve exactly for \( x \) in each case.

(i) \( e^x = 6 \quad \Rightarrow \quad x = \) 

(ii) \( e^{2x+1} = 5 \quad \Rightarrow \quad 2x + 1 = \) 
\[ \Rightarrow \quad x = \] 

(iii) \( 2^x = 6 \quad \Rightarrow \quad \ln 6 = \) 
\[ \Rightarrow \quad x = \] 

(iv) \( 5^x = 3 \quad \Rightarrow \) 

(v) \( \frac{5^x}{2^{x-1}} = 5^x \quad \Rightarrow \)