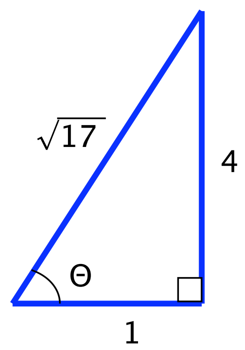
Math 120 Quiz #7

1. (3 pts.) Simplify $\cos(\tan^{-1} 4)$ as much as possible.

   Suppose $\theta = \tan^{-1} 4$. Then $\tan\theta = 4$ with $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$ and we have the following reference triangle.



Since $\cos\theta$ is positive for $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$, we have that $\cos\theta = \frac{1}{\sqrt{17}}$.

So, $\cos(\tan^{-1} 4) = \cos\theta = \frac{1}{\sqrt{17}}$.

2. Find **all** solutions to the following equations.

   (a) (3 pts.) $8\sin x - 4 = 0$

   Solving for $\sin x$: $\sin x = \frac{1}{2}$

   Solving for x:
   $x = \frac{\pi}{6} + 2n\pi$ or $x = \frac{5\pi}{6} + 2n\pi$ for any integer n.

   (b) (4 pts.) $\cos^2\theta = 2 - \cos\theta$

   Getting all terms on one side: $\cos^2\theta + \cos\theta - 2 = 0$

   Factoring: $(\cos\theta + 2)(\cos\theta - 1) = 0$

   $\Rightarrow$ $\cos\theta = -2$ or $\cos\theta = 1$

   There are no solutions to $\cos\theta = -2$.

   The solutions to $\cos\theta = 1$ are $\theta = 2n\pi$ for any integer n.

   So, the solutions to the original equation are $\theta = 2n\pi$ for any integer n.