

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Explain why it is true that, for any angle θ , $\sin^2 \theta + \cos^2 \theta = 1$.

- (b) Use the identity of the previous part to show that, for any angle θ for which $\sin \theta \neq 0$, $1 + \cot^2 \theta = \csc^2 \theta$. Please, explain all your steps.

2. Calculate the exact value of $\cos 105^\circ$.

3. Suppose that you know that $\tan \alpha = \frac{5}{12}$, with $\cos \alpha > 0$, and that $\sin \beta = -\frac{3}{5}$, with $\tan \beta > 0$. Calculate the exact value of $\sin(\beta - \alpha)$.