EXAM 2 - MATH 131 Thursday, October 13

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Verify the following trigonometric identity:

$$\frac{\sin x}{1-\sin x} - \frac{\cos x}{1-\sin x} = \frac{1-\cot x}{\csc x - 1}.$$

(Please show clearly what happens at each step of your verification.)

2. Compute the exact values of the expressions:

   (a) $\cos 212^\circ \cos 122^\circ + \sin 212^\circ \sin 122^\circ$

   (b) $\sin 195^\circ$

3. Given $\cos\alpha = -\frac{3}{5}$, α in Quadrant III, and $\sin\beta = \frac{5}{13}$, β in Quadrant I, find $\sin(\alpha - \beta)$ and $\cos(\alpha + \beta)$.

4. If $\sin\alpha = -\frac{3}{5}$ and $\tan\alpha > 0$, compute the values $\cos 2\alpha$ and $\sin\frac{\alpha}{2}$.

5. Verify the identity

$$\sin^2 \frac{x}{2} = \frac{\sec x - 1}{2 \sec x}.$$

Please, show all your steps clearly **with explanations**. (**Hint:** Start from the right-hand side.)