Exam IV

[10 pts] **Problem 1.** Write an expression of $\cos x$ in terms of $\tan x$. Be sure to rationalize the denominator if necessary.

[10 pts] **Problem 2.** Write the following expression in terms of $\sin\theta$ and $\cos\theta$, and simplify so that no quotients appear in the final answer.

$$\csc\theta - \cot\theta\cos^3\theta$$

[15 pts] **Problem 3.** Find the **exact** value of $\cos\left(\frac{11\pi}{12}\right)$.

[15 pts] **Problem 4.** Write an expression for $\sin 3x$ in terms of $\sin x$ only.

[15 pts] **Problem 5.** Sketch a graph for the given expression and conjecture an identity. Veryify your conjecture is correct algebraically.

$$\cos\left(\frac{3\pi}{2} + x\right)$$

[20 pts] **Problem 6.** Verify the identity

$$\frac{\cos\theta}{1-\sin\theta} = \sec\theta + \tan\theta$$

[15 pts] **Problem 7.** Recall that the half angle formula for sin is: $\sin\frac{a}{2} = \pm\sqrt{\frac{1-\cos a}{2}}$. Use the half angle formula to calculate the **exact** value for $\sin(-67.5^\circ)$. You may not use a calculator, and you should rationalize the denominator if necessary.