MATH 31 **Name _____**

TRIGONOMETRY HW #1 **Date _____**

1. Evaluate each of the following using trigonometric identities, $\lim_{x\to 0}\frac{\sin x}{x}=1$ and $\lim_{x\to 0}\frac{\cos x-1}{x}=0$.

   a) $\lim_{x\to 0}\frac{\sin\frac{1}{2}x}{x}$

   b) $\lim_{x\to 0}\frac{\cos\left(\frac{\pi}{2}-x\right)}{x}$

   c) $\lim_{x\to 0}\frac{1-\cos 2x}{x}$

2. Differentiate with respect to x.

a) $y = x^2 \sin x$

b) $y = \dfrac{\sin x}{1 - 2\cos x}$

3. Find $\frac{dy}{dx}$ using implicit differentiation for the equation: $\cos(x+y) = y\sin x$

4. Find the equation of the tangent line to $y = \sin x + \cos 2x$ when $x = \frac{\pi}{6}$.