Assignment #5 ***Math 180*** ***Name:***

1. Differentiate the following functions:

a) $f(x)=\left(4x^3+2x^2-4\right)\sin(x)$

b) $f(x)=\dfrac{\left(3x^3+1\right)^2}{\sqrt{x}\cos(x)}$

c) $f(x)=\left(\sqrt{x}-2x\right)^2\csc(x)$

2. Is there a value b that will make $f(x)=\begin{cases} x+b, & if \quad x<0 \\ \cos x, & if \quad x\geq 0 \end{cases}$ continuous at x = 0? Differentiable at x = 0? Give your reasons for your answers.

3. Evaluate the following limits:

a) $\lim_{x\to 0}\dfrac{\cot(2x)}{\csc(x)}$

b) $\lim_{x\to \pi}\dfrac{\tan x}{\sin(2x)}$

c) $\lim_{x\to 0}\dfrac{\cos x\sin x-\tan x}{x^2\sin^2 x}$

d) $\lim_{x\to\frac{\pi}{4}}\dfrac{\sin x-\cos x}{\cos(2x)}$

e) $\lim_{x\to 0}\dfrac{\tan(3x)}{\tan(5x)}$

f) $\lim_{t\to 0}\dfrac{\sin^2(5t)}{t^2}$

4. Find equation of the tangent line to the curve at given points: $f(x)=\sec x-2\cos x \;\; at \;\; x=\dfrac{\pi}{3}$