Math 220 **Worksheet** **Summer 2015**

1. Suppose $y^3 + 7xy + x^4 = 9$. Determine the equation of the tangent line to the curve at the point $(1, 1)$.
2. Show that there is some a with $0 < a < 2$ such that $a^2 + cos(\pi a) = 4$
3. Show that the equation $xe^x = 2$ has a solution in the interval (0,1).
4. Find the equation of the tangent line to the curve $y = e^x secx$ at the point $x = \frac{\pi}{4}$
5. Differentiate the following with respect to x.
   (a) $e^{\cos x}$
   (b) $(4x^2 + 5)^3$
   (c) $\ln(secx)$
   (d) $x^2 \log(x^3 + 2)$
   (e) $\frac{1-secx}{tanx}$
   (f) $y = sec^4 x$
   (g) $y = \frac{1}{\sqrt{x^3+6}}$
   (h) $y = \sqrt{xcotx}$
6. Find all x values such that $f(x) = 2sinx + sin^2 x$ has a horizontal tangent at x.
7. Evaluate $\lim_{x\to 0} \frac{sin2x}{sin4x}$
8. Evaluate $\lim_{x\to 0} \frac{\sin x^2}{x}$
9. Let $h(x) = f \circ g(x),\ k(x) = g \circ f(x),\ w(x) = f(x) + g(x),\ q(x) = f(x) - g(x),\ p(x) = \frac{f(x)}{g(x)}$ and $r(x) = f(x).g(x)$. Evaluate $h'(-1), k'(2), w'(3), q'(4), p'(-1), r'(4)$.

x	f(x)	g(x)	f'(x)	g'(x)
-1	4	3	-1	2
2	3	4	2	-1
3	-1	2	3	4
4	2	-1	4	3

10. Find the derivative of y with respect to x (i.e $\frac{dy}{dx}$)

(a) $ln(xy) = cos(x^4)$

(b) $x^{2/3} + y^{2/3} = \pi$

(c) $sin(xy) = ln(\frac{x}{y})$

11. Differentiate each function with respect to x.

(a) $cos^{-1}(x) - 7x^2$

(b) $tan^{-1}(2x^6)$

(c) $csc^{-1}(4x^3)$