Worksheet 10 - Section 2.5

(1) Find the derivative of the function.

(a) $F(x) = (5x^6 + 2x^3)^4$

(b) $y = (\dfrac{x^2+1}{x^2-1})^3$

(c) $f(x) = sin(x\cos x)$

(d) $G(y) = \dfrac{(y-1)^4}{(y^2+2y)^5}$

(e) $A(t) = \dfrac{1}{(\cos t + \tan t)^2}$

(f) $h(v) = v\sqrt[3]{1+v^2}$

(g) $h(t) = (t+1)^{2/3}(2t^2-1)^3$

(h) $h(\theta) = \tan(\theta^2 \sin\theta)$

(i) $y = \dfrac{\cos(\pi x)}{\sin(\pi x) + \cos(\pi x)}$

(j) $y = \sin\sqrt{1+x^2}$

(k) $y = (\dfrac{1-\cos(2x)}{1+\cos(2x)})^4$

(l) $y = \sin(\sin(\sin x))$

(2) Find y' and y'' for $y = \cos(\sin 3\theta)$.

(3) Find an equation of the tangent line to the curve $y = \sin(\sin x)$ at the point $(\pi, 0)$.

(4) The curve $y = |x|\sqrt{2-x^2}$ is called a bullet-nose curve.
Find an equation of the tangent line to the curve at the point $(1, 1)$.

(5) Find all the points on the graph of the function

$$f(x) = 2\sin x + \sin^2 x$$

at which the tangent line is horizontal.

(6) A table of values for f, g, f', and g' is given:

x	f(x)	g(x)	f'(x)	g'(x)
1	3	2	4	6
2	1	8	5	7
3	7	2	7	9

(a) If $h(x) = f(g(x))$, find $h'(1)$.

(b) If $H(x) = g(f(x))$, find $H'(1)$.

(7) If f and g are the functions whose graphs are shown, let

$$u(x) = f(g(x)),\ v(x) = g(f(x)),\ \text{and}\ w(x) = g(g(x)).$$

Find each derivative, if it exists. If it does not exist, explain why.
(a)$u'(1)$ (b) $v'(1)$ (c) $w'(1)$