[10pts] 1. Find the domain *D* of the function. (Write answer in interval notation.)

$$f(x) = \frac{x-1}{x^2+5x-6}$$

D =			

[8 pts] 2. Find all solutions of
$$\cos(2t) = -1$$

t =

[16 pts] 3. Find the following limit. If the limit doesn't exist, write 'DNE'

(a)
$$\lim_{x\to 4} \frac{16-x^2}{4-x}$$

(b)
$$\lim_{x \to 3} \frac{x+3}{x-3}$$

[9 pts] 4. Find the value of c, such that function

$$f(x) = \begin{cases} \frac{c-2}{x}, & \text{if } x \le -1 \\ x+2c, & \text{if } x > -1 \end{cases}$$

is continuous at x = -1.

c =			

[8 pts]5. Let
$$f(x) = \frac{1}{x-1}$$
, find $f'(x)$ by using $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

f'(x) =

[8 pts]6. Find an equation of the tangent line to the graph of $f(x) = x^2 + 1$ at the point (1, 2).

Equation is:

7. Find the derivative of functions by using the rules of differentiation.

[8pts] (a) $f(x) = \frac{3}{x^3} - \frac{x^3}{3}$

f'(x) =

[8pts] (b) $g(x) = \frac{2}{\sqrt{x}} + \sin x$

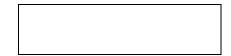
g'(x) =

8. A hot-air balloon rises vertically from the ground so that its height after t sec is $h(t) = \frac{1}{3}t^3 + 3t$ ft $(0 \le t \le 10)$. [5 pts]

(a) What is the average velocity of the balloon between t=1 and t=3?

[5 pts]

(b) What is the instantaneous velocity of the balloon at the end of 3 sec?



9. Growth Rate. The population of a city grows from an initial size of 10,000 to an amount *P*, given by $P(t) = 10,000 + 50t^2$, where *t* is in years.

[5pts](a) Find the growth rate of *P* with respect to *t*.

[5pts](b) Find the number of people in the city after 20 years (at t = 20).

[5pts](c) Find the growth rate at t = 20.