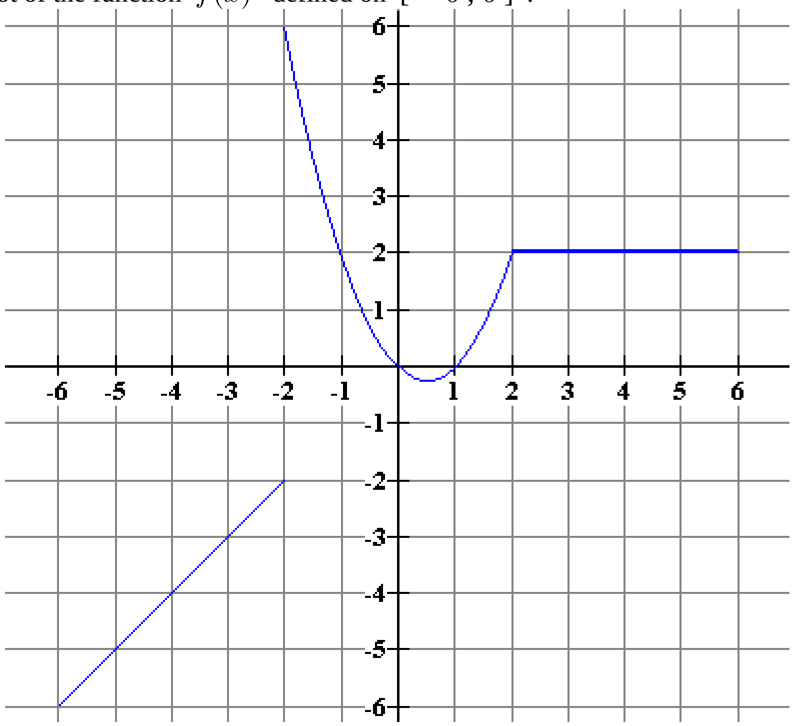
Exam 2 Calculus I 804-231-005 Spring 2009 /100

Name ________________

1. Below is a plot of the function $f(x)$ defined on $[-6, 6]$.



Evaluate the following: (18 points)

a) $f'(-3)$ = ____________

b) $f'(4)$ = ____________

c) $\lim_{x \to -2^-} f(x)$ = ____________

d) $\lim_{x \to -2^+} f(x)$ = ____________

e) $\lim_{t \to 0} \frac{f(t-4)-f(-4)}{t}$ = ____________

f) At what values of x in $(-6, 6)$ does $f'(x)$ fail to exist?

2. Evaluate the following limits: (18 points)

a) $\lim_{x \to 0} \frac{1}{x^4} \sin(4x^4)$ = ____________________

b) $\lim_{x \to \infty} \frac{1}{x^4} \sin(4x^4)$ = ____________________

c) $\lim_{x \to 0} \frac{x}{\tan(\frac{x}{2})}$ = ____________________

3. (16 points)
Find the equation of the tangent line to the curve defined by $x^2 + 3xy + y^2 + 1 = 0$ at the point $(-2, 5)$.

Compute the following derivatives for the given functions. (32 points)

4.

a) $f(x) = \sqrt{3x^2 - 4x + 16}$ $f'(x) =$ ______________________________

b) $f(x) = \frac{x^2}{x^2+1}$ $f'(x) =$ ______________________________

c) $f(x) = \frac{11x^7 - 14x^6 + 13x^5 - 4}{x^6}$ $f'(x) =$ ______________________________

d) $f(x) = \cos^2\left(2x - \frac{\pi}{4}\right) = \left[\cos\left(2x - \frac{\pi}{4}\right)\right]^2$ $f'(x) =$ ______________________________

5. (18 points)

The displacement s from the origin of a non-uniformly accelerated particle is given by the following function of time t :
(A negative displacement means motion to the left, a positive displacement is motion to the right.) The distance unit m stands for meter and the time unit sec stands for second (**NOT the SECANT function!!**).

$s(t) = 10\mathrm{m} + 1.5\mathrm{m}\cos(\frac{2\pi}{\text{sec}}t)$

a) Determine the velocity, v , as a function of time. $v =$ ______________________________

b) Determine the acceleration, a , as a function of time. $a =$ ______________________________

c) At what times in the interval $[0\ \text{sec},\ 1\ \text{sec}]$ is the particle moving to the left?