

**Mathematics 19A; Fall 2001; V. Ginzburg  
Practice Midterm II**

1. For each of the ten questions below, state whether the assertion is *true* or *false*.
- (a) Let  $f(x)$  and  $g(x)$  be differentiable functions. Then  $(f(x)g(x))' = f'(x)g(x) + g'(x)f(x)$ .
  - (b)  $\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1-x^2}}$ .
  - (c) The function  $f(x) = \sqrt[3]{x}$  is differentiable at 0.
  - (d)  $\lim_{x \rightarrow 0} \frac{\tan(7x)}{x} = 7$ .
  - (e)  $\frac{d}{dx} \tan x = \frac{1}{\sin^2 x}$ .
  - (f)  $\frac{d}{dx} \ln(f(x)) = \frac{f'(x)}{f(x)}$ .
  - (g) Every continuous functions is differentiable.
  - (h)  $\frac{d}{dx} \ln |x| = \frac{1}{x}$ .
  - (i)  $\frac{d}{dx} a^x = ax^{a-1}$ .
  - (j)  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ .
2. Find  $f'(x)$  for the following functions.

(a) 
$$f(x) = \tan(\cos x).$$

(b) 
$$f(x) = \log_2(\sin^{-1} x).$$

(c) 
$$f(x) = \frac{x \ln x}{e^x}.$$

(d) 
$$f(x) = \frac{\sqrt{1+x}}{(x^3-5)^7}$$

3. Let  $f(x) = \frac{1-x^2}{1+x^2}$ .

- (a) Find  $f'(x)$ .
  - (b) Find the equation of the tangent line to the graph of  $f(x)$  at the point  $P(1,0)$ .
4. Find  $\frac{dy}{dx}$  by implicit differentiation, where  $y = f(x)$  is given by the equation

$$x^2y + y^2x = 2x$$

and  $x = 1$  and  $y = -2$ .