

## PRACTICE EXAM 3 - MATH 151

DUE DATE: Friday, March 19

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 3 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Find a formula for  $f^{-1}(x)$  and state the domain of  $f^{-1}$  if  $f(x) = x - 5x^2$ ,  $x \geq 1$ .
2. Find the domain of the function  $f(x) = \log_{2004} \frac{x-1}{x^2-3x-4}$ .
3. Compute the derivative  $\frac{dy}{dx}$ 
  - (a)  $y = e^{x \tan x}$
  - (b)  $y = \ln(x \tan y)$
  - (c)  $y = e^x \ln x$
  - (d)  $y = x^2(\sin^{-1} x)^3$
4. Find the equation of the tangent line to the graph of  $y = (x^2 + 3)^{\ln x}$  at  $x = 1$ .
5. Find the limits
  - (a)  $\lim_{x \rightarrow 0^+} \frac{1 - \ln x}{e^{1/x}}$
  - (b)  $\lim_{x \rightarrow +\infty} x e^{-x}$
  - (c)  $\lim_{x \rightarrow 0} (e^x + x)^{1/x}$
6. Create the table of study for the function  $f(x) = \ln(1 + x^2)$  and then roughly sketch its graph.

These formulas are offered courtesy of George<sup>®</sup> for your perusal:

1.  $(\sin^{-1} x)' = \frac{1}{\sqrt{1-x^2}}, -1 < x < 1$
2.  $(\cos^{-1} x)' = \frac{-1}{\sqrt{1-x^2}}, -1 < x < 1$
3.  $(\tan^{-1} x)' = \frac{1}{1+x^2}, -\infty < x < \infty$
4.  $(\sec^{-1} x)' = \frac{1}{|x|\sqrt{x^2-1}}, 1 < |x|$