MATH 1520 A03 **B08**
March 17, 2008

Tutorial Test 4

Department of Mathematics
University of Manitoba

Student Name _____ Student ID _____ Marks _____/25

You are given 30 minutes to finish ALL questions; Please show ALL your work to get full credits.

1. Answer the following questions. **DO NOT SIMPLIFY.**

[2] (a) Find $f''(x)$, if $f(x) = x \ln x$

[3] (b) Calculate $D_x \left[\dfrac{\log_3 (x^3 - 2x)}{x^2 + 1} \right]$.

[3] (c) Differentiate $y = \left[\dfrac{1}{x} - e^{2x^3} \right]^{2/3}$.

[3] 2. Suppose that f is differentiable and $f'(4) = 1$. Find $\dfrac{d}{dx}\left[f(x^2)\right]$ when $x = 2$.

[14] 3. Fill in the table with the requested information about the function

$$f(x) = x^4 - 2x^2 + 2$$

The first derivative is given by

$$f'(x) = 4x^3 - 4x$$

GIVE ANSWERS ONLY. Write "**NONE**" for any item that does not exist.

Domain of f	[1/2]
y-intercept	[1/2]
The instantaneous rate of change of f at $x = -1$	[1/2]
$\lim_{h \to 0} \dfrac{f(1+h) - f(1)}{h}$	[1/2]
The slope of the tangent line to the curve $y = f(x)$ at which $x = 2$	[1/2]
The derivative of $f'(x)$, i.e. $f''(x)$	[1/2]
Critical number(s)	[3]
Open interval(s) where f is decreasing	[2]
Open interval(s) where f is increasing	[2]
x and y coordinates of all relative minima	[2]
x and y coordinates of all relative maxima	[2]