

THE UNIVERSITY OF MANITOBA

October 23, 2003

MIDTERM EXAMINATION

PAPER NO. _____

PAGE NO: 5 of 7

DEPARTMENT & COURSE NO: 136.151

TIME: 1 HOUR

EXAMINATION: Applied Calculus I

EXAMINERS: Various

Values

- [10] 4. Find the equation of the tangent line to the curve $2x^3 - x^2y^2 + 3y - 4 = 0$ at the point $(1,2)$. What is the equation of the normal line to the curve at that point? (Recall that the normal line to a curve is the line perpendicular to the tangent line.)

$$(2x^3 - x^2y^2 + 3y - 4)' = 0' \quad (\text{with respect to } x)$$

$$\downarrow \quad \rightarrow \quad 6x^2 - (2xy^2 + x^2 2yy') + 3y' = 0$$

$$y' = \frac{2xy^2 - 6x^2}{-2x^2y + 3}$$

AT $(1,2)$ WE HAVE $y' = -2$.

TANGENT LINE: $y = -2x + b$ AND

SINCE $2 = -2 + b$ WE FIND THAT $b = 4$

SO $\rightarrow y = -2x + 4$

SLOPE OF NORMAL LINE IS $-\frac{1}{-2} = \frac{1}{2}$.

NORMAL LINE:

$$y = \frac{1}{2}x + \frac{3}{2}$$