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Quiz 5

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. §24.1 #31 *(5 marks)* Find the equations of the lines normal to the indicated curves at the given points. Sketch the curve and the normal line.

$$y = 6x - 2x^2 \text{ at } (2, 4)$$

Let $f(x) = 6x - 2x^2$

$\quad f'(x) = 6 - 4x$

Then $\quad m_{tan} = f'(2)$

$\qquad\qquad = 6 - 4(2)$

$\qquad\qquad = -2$

$\therefore m_{normal} = \dfrac{-1}{m_{tan}}$

$\qquad\qquad = \dfrac{-1}{-2}$

$\qquad\qquad = \dfrac{1}{2}$

$\therefore y = m_{normal} \, x + b$

$\quad y = \dfrac{1}{2}x + b$

$\quad 4 = \dfrac{1}{2}(2) + b$

$\quad 3 = b$

$\therefore y = \dfrac{1}{2}x + 3$

<u>Info of graph of parabola</u>

<u>x-int:</u> $0 = y$

$\qquad 0 = 6x - 2x^2$

$\qquad 0 = 2x(3 - x)$

$\qquad\qquad \diagup \qquad \diagdown$

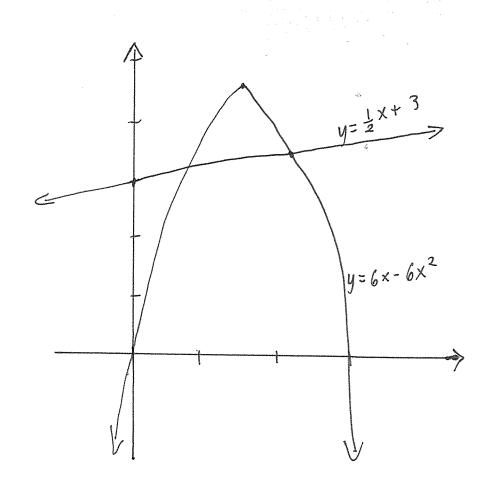$\qquad x = 0 \qquad x = 3$

<u>y-int:</u> $(0, 0)$

<u>vertex:</u> $\left(\dfrac{-b}{2a}, f\left(\dfrac{-b}{2a}\right) \right)$

$\qquad = \left(\dfrac{-6}{2(-2)}, f\left(\dfrac{-6}{2(-2)}\right) \right)$

$\qquad = \left(\dfrac{3}{2}, f\left(\dfrac{3}{2}\right) \right)$

$\qquad = \left(\dfrac{3}{2}, 6\left(\dfrac{3}{2}\right) - 2\left(\dfrac{3}{2}\right)^2 \right)$

$\qquad = \left(\dfrac{3}{2}, 9 - \dfrac{9}{2} \right) = \left(\dfrac{3}{2}, \dfrac{9}{2} \right)$

Question 2. §24.2 #5 *(5 marks)* Find the indicated roots of the given equations to at least four decimal places by using Newton's method.

$x^3 - 6x^2 + 10x - 4 = 0$ between 0 and 1)

Let $f(x) = x^3 - 6x^2 + 10x - 4$

$\qquad f'(x) = 3x^2 - 12x + 10$

and $x_0 = 0.5$

and $x_n = x_{n-1} - \dfrac{f(x_{n-1})}{f'(x_{n-1})}$

n	x_n	$f(x_n)$	$f'(x_n)$	$f(x_n)/f'(x_n)$
0	0.5	-0.375	4.75	-0.078947368
1	0.578947368	-0.027555038	4.058171749	-0.006790012
2	0.585737381	-0.000196236	4.000416267	-0.000049054
3	0.585786435			