

Math 221, Quiz III, September 29, 2000

Answers

I (a) (10 points) Find a formula for $\frac{dy}{dx}$ in terms of x and y , if x and y are related by the equation –

$$x^3 + y^3 = 3xy.$$

(b)(10 points) For x and y as in part (a), find a formula for $\frac{d^2y}{dx^2}$ in terms of x , y and $\frac{dy}{dx}$.

(a) Differentiate implicitly the relation $x^3 + y^3 = 3xy$ to obtain

$$3x^2 + 3y^2 \frac{dy}{dx} = 3\left(x \frac{dy}{dx} + y\right),$$

so

$$(y^2 - x) \frac{dy}{dx} = (y - x^2)$$

so

$$\frac{dy}{dx} = \frac{y - x^2}{y^2 - x}.$$

(b) Differentiate the last equation using the Quotient Rule:

$$\frac{d^2y}{dx^2} = \frac{\left(\frac{dy}{dx} - 2x\right)(y^2 - x) - (y - x^2)\left(2y\frac{dy}{dx} - 1\right)}{(y^2 - x)^2}.$$

----- Mon Oct 2 09:07:05 2000

--

There are 197 scores

range	count	percent
18... 20	129	65.5%
16... 17	24	12.2%
14... 15	6	3.0%
12... 13	4	2.0%
10... 11	7	3.6%
8... 9	6	3.0%
0... 7	21	10.7%

Mean score = 16.7.

--