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* Course / Review / Practice exam (untimed, with solutions)

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1/1 point (ungraded)

Let $oldsymbol{C}$ be the curve defined by the equation

$$x^3 - 2x + y^2 = 3.$$

Notice that the point (1,2) is on the curve C. Suppose that we put our finger down on the point (1,2) and slide it along the curve $m{C}$ so that the $m{y}$ coordinate gradually increases from $m{2}$ to $m{2.01}$. Which of the following is the best approximation for the point where we end up:

(1.01, 2.01)

(1, 2.01)

(0.99, 2.01)

(0.98, 2.01)

(0.97, 2.01)

 \bigcirc (0.96, 2.01)



Solution:

To approximate the point on $oldsymbol{C}$ where $oldsymbol{y}=2.01$ and $oldsymbol{x}$ is approximately 1, we replace the curve by its linear approximation at the point (1,2). Letting $f\left(x,y
ight)=x^3-2x+y^2$, we compute

$$egin{aligned} f\left(x,y
ight) &= x^3 - 2x + y^2 \implies f\left(1,2
ight) = 3, \ f_x\left(x,y
ight) &= 3x^2 - 2 \implies f\left(1,2
ight) = 1, \ f_y\left(x,y
ight) &= 2y \implies f\left(1,2
ight) = 4. \end{aligned}$$

Therefore the linear approximation at (1,2) is

$$f(x,y) \approx 3 + 1(x-1) + 4(y-2)$$
.

We are seeking for x such that f(x,2.01)=3; that gives

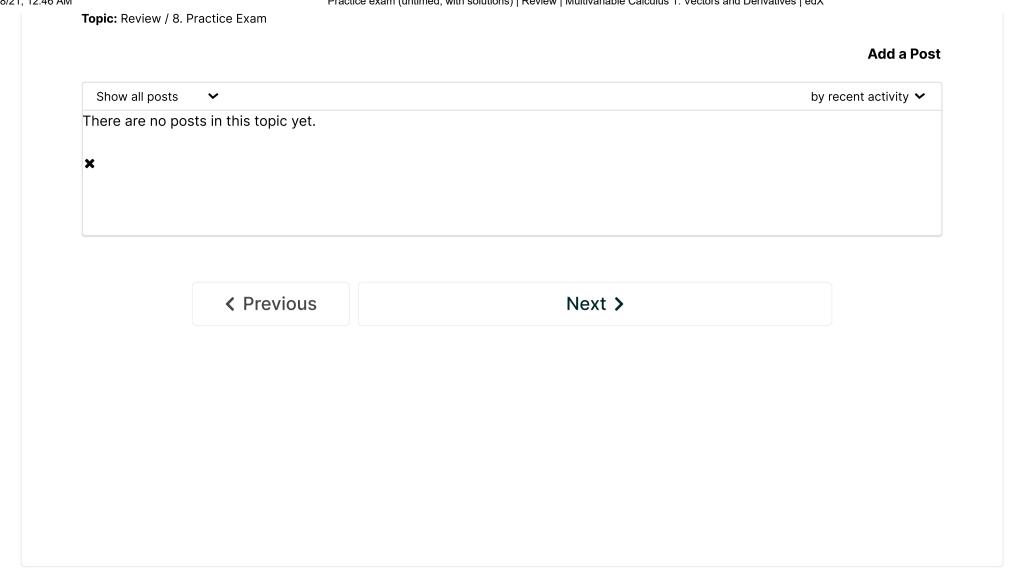
$$3 = f\left(x, 2.01
ight) pprox 3 + 1\left(x - 1
ight) + 4\left(2.01 - 2
ight) = 3 + \left(x - 1
ight) + 0.04.$$

Solving for x then gives x=1-0.04=0.96. Hence the best approximation is $|\,(0.96,2.01)\,$

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1 Answers are displayed within the problem

8. Practice Exam



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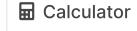


















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