

Elements of Calculus I, MATH 180 Quiz 4
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Key

- (1) Suppose that the percentage of vegetarians in the US is given by the function $P(t)$ for $0 \leq t \leq 12$ where $t = 0$ represents the year 2000. Suppose $P(6) = 12.2$, $P'(6) = -0.8$ and $P''(6) = 0.05$. Give interpretations of each of these quantities.

(+1) $P(6) = 12.2$ means in 2006 the percentage of the US population which was vegetarian was 12.2%.

out of 3 (+1) $P'(6) = -0.8$ means in 2006 the percentage of vegetarians was falling by .8%/yr.

(+1) $P''(6) = .05$ means in 2006 the decline of the percentage change is slowing by .05%/yr².

- (2) If the cost function of producing x tablets is $C(x) = 10,000 + 100x - .05x^2$. What is the marginal cost of producing 800 tablets? What does $C'(800)$ tell you about the cost of producing 801 tablets?

(+1) $C'(x) = 100 - .1x$

(+1) $C'(800) = 100 - .1(800) = 100 - 80 = 20$

out of 4 (+2) $C'(800) = 20$ means that the cost to produce the 801 tablet after 800 have been produced is approximately \$20.

- (3) Find the first three derivatives of $f(x) = 10x - 4x^3 + 6x^5$.

(+1) $f'(x) = 10 - 12x^2 + 30x^4$

(+1) $f''(x) = -24x + 120x^3$

(+1) $f'''(x) = -24 + 360x^2$