Quiz 5 (Individual) for Mathematics 223
Introductory Analysis I - Spring 1999
Material Covered: Sections 4.4,4.5 of text and notes
For: 31st March

This is a 15 minute quiz, worth 6% and marked out of 6 points. The total possible points awarded for each question is given in square brackets at the beginning of each question. Anything that can fit on one side of an $8\frac{1}{2}$ by 11 inch piece of paper may be used as a reference during this quiz. A calculator may also be used. No other aids are permitted.

Name (please print): ________________________ . **ID Number:** ____________.

last first

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1. [2] Approximate $\sqrt[5]{241} = 241^{\frac{1}{5}}$ by letting $f(x) = \sqrt[5]{x}$ and $\Delta x = dx = -2$. Then $f(x + \Delta x) \approx f(x) + f'(x)dx =$ (circle one)

(a) 2.995032 (b) 2.995045 (c) 2.995053 (d) 2.995062 (e) none of these

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2. Let $yx^{10} - y^3 = 17 - 3x$.

(a) [1] Then $\frac{dy}{dt} =$ (circle one)

(a) $\left(\frac{10yx^9+4}{x^{10}-3y^2}\right)\frac{dx}{dt}$ (b) $\left(\frac{10yx^9+3}{x^{10}+3y^2}\right)\frac{dx}{dt}$ (c) $\left(\frac{10yx^9+3}{x^{10}-3y^2}\right)\frac{dx}{dt}$ (d) $\left(\frac{10x^9+3}{x^{10}-3y^2}\right)\frac{dx}{dt}$ (e) none of these

(b) [1] If $\frac{dx}{dt} = 3$ and $x = 1$, $\frac{dy}{dt} =$ (circle one)

(a) $\left(\frac{30y+12}{1-3y^2}\right)$ (b) $\left(\frac{30y+9}{1+3y^2}\right)$ (c) $\left(\frac{30y+9}{1-3y^2}\right)$ (d) $\left(\frac{30+9}{1-3y^2}\right)$ (e) none of these

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3. Demand, x, is related to price, p, in the following way: $x = f(p) = 1500p^{-\frac{1}{2}}$.

(a) [1] Then $E(p) =$ (circle one)

(a) $-\frac{1}{2}$ (b) $\frac{p}{2}$ (c) $-\frac{p}{2}$ (d) $\frac{1}{2}$ (e) none of these

(b) [1] If the price is presently $1.25, then the demand is (circle one)

(a) elastic (b) inelastic (c) unit elastic (d) decreasing (e) increasing

1. (d) 2.995062: Approximate $\sqrt[5]{241} = 241^{\frac{1}{5}}$ by letting $f(x) = \sqrt[5]{x}$ and $\Delta x = dx = -2$. $f(x + \Delta x) \approx f(x) + f'(x)dx =$ **2.995062**
Since $x = 243$ and $f'(x) = \frac{1}{5}x^{-4/5}$,
then $f(241) = f(x + \Delta x) = f(243 - 2) = f(243) + \Delta y \approx f(243) + dy = f(243) + f'(243)dx = \sqrt[5]{243} + \frac{1}{5}(243)^{-4/5}(-2) = 2.995062$

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2. [2] Let $yx^{10} - y^3 = 17 - 3x$

(a) (e) none of these: $\frac{dy}{dt} = \left(\frac{10yx^9+3}{-x^{10}+3y^2}\right)\frac{dx}{dt}$
since by implicit differentiation, $y10x^9\frac{dx}{dt} + x^{10}\frac{dy}{dt} - 3y^2\frac{dy}{dt} = -3\frac{dx}{dt}$

(b) (e) none of these: If $\frac{dx}{dt} = 3$ and $x = 1$, $\frac{dy}{dt} = \left(\frac{30y+9}{-1+3y^2}\right)$

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3. [2] If demand, x, is related to price, p, in the following way: $x = f(p) = 1500p^{-\frac{1}{2}}$.

(a) (d) $\frac{1}{2}$: Then $E(p) = 1500p^{-\frac{1}{2}}$

since $f'(p) = -\frac{1500}{2}p^{-\frac{3}{2}}$ and $E(p) = -\frac{pf'(p)}{f(p)} = -\frac{p\left(-\frac{1500}{2}p^{-\frac{3}{2}}\right)}{1500p^{-\frac{1}{2}}} = \frac{1}{2}$

(b) (b) inelastic: If the price is presently \$1.25, then the demand is **inelastic**
since $1 > E(P) = \frac{1}{2}$