Quiz 5 for Mathematics 223
Introductory Analysis I - Fall 2001
Material Covered: Sections 3.6,3.7 of workbook and text
For: Friday, 2nd November

This is a 15 minute quiz, worth 5% and marked out of 5 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 points] For $y = 4x + 1$, $x = 2$ and $\Delta x = 0.1$,

(a) $\Delta y =$ (circle closest one) **0.1 / 0.2 / 0.3 / 0.4 / 0.5**

(b) $dy =$ (circle closest one) **0.1 / 0.2 / 0.3 / 0.4 / 0.5**

2. [1 point] If $xy + 3x + 2y = 4$, the slope of the curve at the point $\left(1, \frac{1}{3}\right)$ is
(circle closest one) $-\frac{7}{9}$ / $-\frac{8}{9}$ / $-\frac{9}{9}$ / $-\frac{10}{9}$ / $-\frac{11}{9}$

3. [2 points] Two cars start from the same point at the same time. One travels north at 30 mph ($\frac{dy}{dt} = 30$) and the other travels east at 45 mph ($\frac{dx}{dt} = 45$). How fast is the distance between them increasing (what is $\frac{dD}{dt}$?) at the end of 2 hours ($x = 90$, $y = 60$, $D = \sqrt{90^2 + 60^2}$)?

(1) (a) **0.4**

$$
\begin{aligned}
\Delta y &= f(x + \Delta x) - f(x) \\
&= 4(x + \Delta x) + 1 - (4x + 1) \\
&= 4\Delta x \\
&= 4(0.1) = 0.4
\end{aligned}
$$

   (b) **0.4**

$$
\begin{aligned}
dy &= f'(x)dx \\
&= 4dx \\
&= 4(0.1) = 0.4
\end{aligned}
$$

(2) $-\dfrac{10}{9}$

$$
\begin{aligned}
xy + 3x + 2y &= 4 \\
x\frac{dy}{dx} + y(1) + 3 + 2\frac{dy}{dx} &= 0 \\
\frac{dy}{dx} &= -\frac{y + 3}{x + 2} \\
&= -\frac{1/3 + 3}{1 + 2} \\
&= -\frac{10}{9}
\end{aligned}
$$

(3) **54.08**

$$
\begin{aligned}
\frac{d}{dt}D^2 &= \frac{d}{dt}x^2 + \frac{d}{dt}y^2 \\
2D\frac{dD}{dt} &= 2x\frac{dx}{dt} + 2y\frac{dy}{dt} \\
\frac{dD}{dt} &= \frac{x\frac{dx}{dt} + y\frac{dy}{dt}}{D} \\
&= \frac{(90)(45) + (60)(30)}{\sqrt{90^2 + 60^2}}
\end{aligned}
$$