

L^AT_EX Assignment 1

May 17, 2012

Create a new L^AT_EX file with the name `username.tex` (where *username* is your Mines Email ID) containing at first, the commands

```
\documentclass[letterpaper,10pt]{article}, \begin{document}, and \end{document}.
```

Also, within the preamble of your document include the command

```
\usepackage[top=2.5cm, bottom=2cm, left=1cm, right=1cm]{geometry}
```

Reproduce each of the following within your .tex file:

1. The derivative of the indirect function $f[g(x)]$ is $\{f[g(x)]\}' = f[g(x)]g'(x)$. For the second derivative of the product of $f(x)$ and $g(x)$ one has $[f(x)g(x)]'' = f''(x)g(x) + 2f'(x)g'(x) + f(x)g''(x)$.
2. The reduced cubic equation $y^3 + 3py + 2q = 0$ has one real and two complex solutions when $D = q^2 + p^3 > 0$. These are given by Cardan's formula as

$$y_1 = u + v, \quad y_2 = -\frac{u+v}{2} + \frac{i}{2}\sqrt{3}(u-v), \quad y_3 = -\frac{u+v}{2} - \frac{i}{2}\sqrt{3}(u-v)$$

where

$$u = \sqrt[3]{-q + \sqrt{q^2 + p^3}}, \quad v = \sqrt[3]{-q - \sqrt{q^2 + p^3}}$$

3. Each of the measurements $x_1 < x_2 < \dots < x_r$ occurs p_1, p_2, \dots, p_r times. The mean value and standard deviation are then

$$x = \frac{1}{n} \sum_{i=1}^r p_i x_i, \quad s = \sqrt{\frac{1}{n} \sum_{i=1}^r p_i (x_i - x)^2}$$

where $n = p_1 + p_2 + \dots + p_r$.

4. Although this equation looks very complicated, it should not present any great difficulties:

$$\int \frac{\sqrt{(ax+b)^3}}{x} dx = \frac{2\sqrt{(ax+b)^3}}{3} + 2b\sqrt{ax+b} + b^2 \int \frac{dx}{x\sqrt{ax+b}}$$

The same applies to $\int_{-1}^8 (dx/\sqrt[3]{x}) = \frac{3}{2}(8^{2/3} + 1^{2/3}) = 15/2$.

Some hints on these

1. Higher derivatives are made with multiple ' symbols: $\$y'''\$$ yields y''' .
2. Use `\mathrm{i}` to denote $\sqrt{-1}$
3. Use `\mathrm{d}x` to denote dx
4. Using your favorite online search engine, investigate the L^AT_EX commands: `int`, `sqrt`, `frac`, `verb` and `maketitle`
5. You may want to try the last one in small chunks of L^AT_EX rather than trying to typeset all at once.
6. With regards to how this instructional page was created, also investigate the L^AT_EX commands: `verb`, `\begin{enumerate}`, `vspace` and `maketitle`