MA 125 VT, Honors CALCULUS I
Test 4, November 18, 2015

Name (Print last name first): .....

Show all your work and justify your answer!

No partial credit will be given for the answer only!

PART I

You must simplify your answer when possible.
All problems in Part I are 8 points each.

1. If $f(x) = \ln(\sec(x))$, find the derivative $f'(x)$.

2. Find the anti-derivative $F(x)$ of the function $f(x) = \tan(x)$.

3. Find the derivative of $f(x) = e^{\sin(x)}$.

4. Evaluate $\int \frac{x^3+1}{x^4+4x}\,dx$

5. Solve $e^{3x+2} = 9$.

6. Solve $\ln(2x+1) = -2$.

7. Use Newton's method to approximate the value of $\sqrt{101}$. Start with $x_1 = 10$ and only compute the second approximate value x_2.

8. Given $f(x) = x^5 + 2x + 1$ show first that $f(x)$ is one-to-one and next compute the derivative $(f^{-1})'(1)$

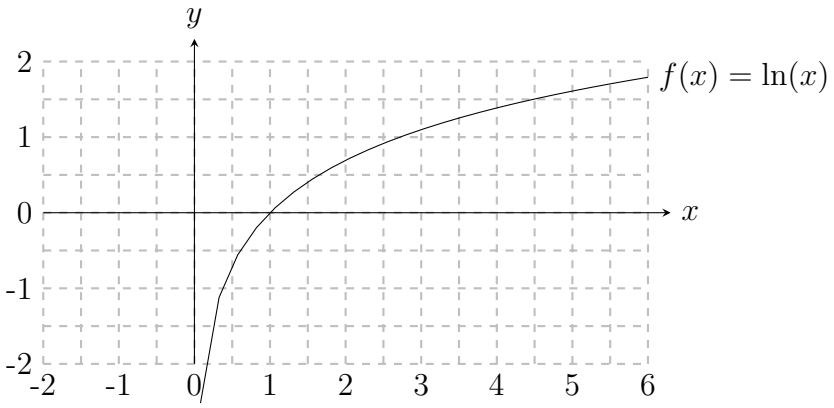
PART II

1. **[8 points]** Comment on the following solution. Explain each of the steps and comment if they are correct.

$$\int_{-1}^{1} \frac{1}{x}\, dx = \ln|x| \,|_{-1}^{1} = \ln(1) - \ln(1) = 0.$$

2. **[12 points]** Given the graph of $y = \ln(x)$ below **read off**:
   (1) the value $y = \ln(1.5)$
   (2) the value of $x = e^{1.5}$
   (3) Estimate the derivative of e^x at $x = 1.5$ (Hint: draw the tangent line and estimate its slope).

   Indicate in the graph how you found your values; do NOT use your calculator to find these values!



3. **[16 points]** Graph the function $f(x) = x^2 \ln(x)$ for $x > 0$. Indicate in the graph:

   (a) x- and y-intercepts

   (b) Horizontal and Vertical asymptotes (if any). [Do $\lim_{x \to 0^+} x^2 \ln(x)$ numerically by computing values at $x = \frac{1}{10}$ and $x = \frac{1}{100}$.]

   (c) Critical points and increasing/decreasing.

   (d) Local/Absolute Max/Min, if any.