Name: ———————————————————————   ———————— **/ 25**

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. **[9 points]** (Optimization) You need to construct a rectangular fence that encloses an area of 300 square feet. The two vertical sides (drawn solid below) will be made of material that costs $5 per foot while the material for the horizontal sides (drawn dashed below) costs $2 per foot. Determine the dimensions of the least expensive fence. Make sure you explicitly address the items below.
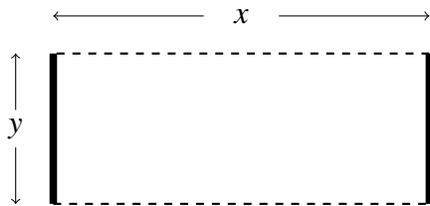
   a. Explicitly state the quantity you want to maximize or minimize.

   b. Identify the domain of your function.

   c. Identify your answer. (Note: Your answer may not be an integer.)

   d. Justify that your answer is correct. That is, use Calculus to show that your answer indeed does represent a maximum or minimum.

2. [8 points] Evaluate the following limits. Before an application of L'Hôpital's Rule, you must indicate the form of the limit ($0/0$ or ∞/∞).

a. $\displaystyle\lim_{x\to 1} \frac{x^{14} - 1}{x^5 - 1}$

b. $\displaystyle\lim_{x\to\infty} \left(1 + \frac{2}{x}\right)^x$

3. [8 points] Evaluate the following indefinite integrals.

a. $\displaystyle\int \left(2 + x + \frac{1}{x^2}\right) dx$

b. $\displaystyle\int \left(\sec(x)\tan(x) + e^x\right) dx$