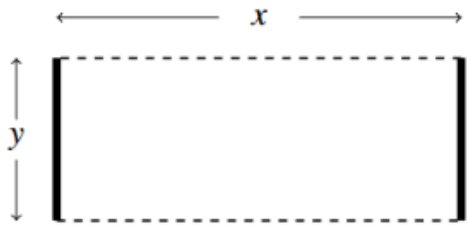
Name: _____ _____ / **25**

Please circle your section: 901 (Gossell) 902 (Gossell) 903 (Graves-McCleary)

No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. **[10 points]** You need to construct a rectangular fence that encloses an area of 100 square feet. The two vertical sides (drawn solid below) will be made of material that costs \$12 per foot while the material for the horizontal sides (drawn dashed below) costs \$3 per foot.



a. Express the **cost** of the fence as a function in terms of 1 variable.

b. Use calculus the find the dimensions of the **least expensive** fence. Justify your answer.

2. [9 points] Evaluate the following limits. **Show your work**, uncluding appropriate use of limit notation. If you use L'Hôpital's rule, you must indicate where you are using it by writing $\overset{H}{=}$ or $\overset{L'H}{=}$ or something similar. Use $+\infty$ or $-\infty$ where appropriate, and if the limit does not exist, write DNE and provide a justification.

a. $\lim_{x\to 2} \dfrac{x^3-5x^2+9x-6}{6x-3x^2}$

b. $\lim_{x\to 0} \dfrac{\sin(x)-x}{e^x-x-1}$

c. $\lim_{x\to+\infty} e^{-x}x^2$

3. [6 points] Evaluate the following antiderivatives. You do not need to simplify your final answers.

a. $\int \left(15x^4+6-2\csc^2(x)\right)dx$

b. $\int \dfrac{x-\sqrt{x}}{x^2}dx$