§ 4.7/4.5 Summary, Math 1410 **Name:**_____

Solving Optimization Problems

A. **Read and Understand the Problem**

B. **Draw a Diagram** if appropriate.

C. **Introduce Notation** Label your variables (with units). Make note of which variable is to be maximized/minimized.

D. **Solve the Problem** Find the appropriate absolute max/min. Be sure to put units in your answer.

Summary of Sketching the Curve $f(x)$:

A. **Domain** Determine the domain of f.

B. **Intercepts** Find the $x-$ and $y-$intercepts.

C. **Symmetry** Determine if the function is even ($f(x) = f(-x)$), or odd ($f(-x) = -f(x)$), or neither. Determine if the function is periodic.

D. **Asymptotes**

1. **Horizontal Asymptotes** Find by computing: $\lim_{x\to\infty} f(x) = L$ and $\lim_{x\to-\infty} f(x) = L$.
2. **Vertical Asymptotes** Find all numbers a such that $\lim_{x\to a^{\pm}} f(x) = \pm\infty$

E. **Critical Numbers** Find the critical Numbers: where $f'(x) = 0$ or $f'(x)$ DNE.

E.5. **Increasing/Decreasing** Find the intervals on which f is increasing ($f' > 0$), and the intervals on which f is decreasing ($f' < 0$).

F. **Local Max/Min** Find the local max/min points. (Use the first or second derivative test. Then use the original function to find the values.)

G. **Concavity and Points of Inflection** Find the intervals on which f is concave up ($f'' > 0$), and the intervals on which f is concave down ($f'' < 0$). Find the points of inflection. (Use the original function to find the values.)

H. **Sketch the Curve**