

**MAT 161-004 and MAT 161-300**  
**Main Topics for Test 3**  
**(Sections 3.11, 4.1 – 4.4, slant asymptotes, 4.7)**  
**Tuesday, Nov. 8, 2011**

### **Hyperbolic functions**

Be able to:

- find derivatives involving  $\sinh x$  and  $\cosh x$
- show how to derive the derivatives of  $\tanh x$ ,  $\coth x$ ,  $\operatorname{sech} x$ , and  $\operatorname{csch} x$
- use the definitions of  $\sinh x$  and  $\cosh x$  and the identity

$\cosh^2 x - \sinh^2 x = 1$  to simplify expressions and verify identities

### **Applications of derivatives**

Be able to:

- find the absolute maximum and absolute minimum values of a function on a closed interval  $[a,b]$
- use L'Hospital's Rule to calculate limits
- set up and solve max/min problems

### **Connection between derivatives $f'$ and $f''$ and the graph of $f$**

Be able to:

- interpret and apply the mean value theorem

Show understanding of the terminology and methods related to:

- the relationship of  $f'$  to the intervals where  $f$  is increasing / decreasing
- the relationship of  $f''$  to the intervals where  $f$  is concave up / concave down
- the relationship of both  $f'$  and  $f''$  to locations ( $x$ -values) where  $f$  has local maximum / minimum points
- points of inflection

### **Miscellaneous**

Be able to:

- find the slant asymptote of a function
- answer true/false questions about the concepts of Chapter 4 (see the True-False Quiz on page 351 (except #18))