Guide to Midterm 3

Topics and Concepts
1. Mean Value Theorem
2. Intervals of increase/decrease and classifying critical points as local max/min
3. Intervals of concavity and inflection points
4. Indeterminate forms and l’Hôpital’s rule
5. Curve sketching
6. Optimization
7. Antiderivatives
8. Definite integrals and area under a curve

Practice problems:
Chapter 4 Review, True-False Quiz: # 1, 5, 7, 9, 19* (*Use the MVT)

Sample problems for each topic:
1. Section 4.2 # 23, 25, 35
2. Section 4.3 # 1, 11, 12, 17
3. Section 4.4 # 13, 15, 17, 45, 55.
   Additional problem: \( \lim_{x \to 0^+} x^3 \ln x \)
4. Section 4.5 # 1, 9
5. Section 4.7 # 8, 21, 34, 37
6. Section 4.9 # 7, 17, 23, 27, 33, 43
7. Section 5.2: The assigned practice problems are sufficient, particularly # 27, 33, 35, 37, 39, 43, 47, 49

Answers to even numbered problems and the additional limit problem:
4.3 #12 Inc: \((-1, 1)\), Dec: \((-\infty, -1) \cup (1, \infty)\), Local max: \(y = 1/2\), Local min: \(y = -1/2\),
CU: \((-\sqrt{3}, 0) \cup (\sqrt{3}, \infty)\), CD: \((-\infty, -\sqrt{3}) \cup (0, \sqrt{3})\), IPs: \(x = 0, \pm \sqrt{3}\)
\[ \lim_{x \to 0^+} x^3 \ln x = 0 \]
4.7 #8: \(L = W = \sqrt{1000} \)
4.7 #34: \(H = \frac{180}{\sqrt{120}}, W = \sqrt{120} \)