

251 Online Exercise Set #3

All work must be neatly shown and mathematically correct to receive full credit.

1. (4 points) Determine the global (absolute) extreme points (exact coordinates) of the function $f(x) = x - \ln(x)$ on the interval $\frac{1}{2} \leq x \leq 2$.
2. (4 points) If $f(x) = ax^3 + bx^2 + cx + d$, $a \neq 0$, determine a , b , c , and d so that f has a local minimum at $(0, 3)$, a local maximum at $(4, 12)$.
3. (7 points) Let $g(x) = x^{2/3}(x-10)$.
 - a. Determine the critical point(s) (exact coordinates) and use the **Second Derivative Test** (and no other method) to classify the critical point(s) as local (relative) maximums or minimums.
 - b. Determine the intervals on which f is concave up and on which f is concave down.
 - c. Determine all points of inflection.
4. (5 points) Let $f(x) = 8 \log_4 x + x^2$. Determine the inflection point(s) of f . Make sure that you prove with a sign chart that they are inflection points. You need to give only the (exact) x-coordinate of the inflection point(s).
5. (5 points) If a rectangle is inscribed in a semicircle of radius 8 find the dimensions of the rectangle that will have the maximum area.

