

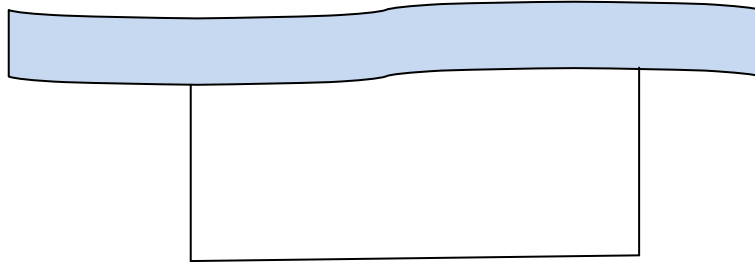
Provide a clear and organized presentation. Show all of your work, completely simplify all answers, and give exact values only.

1. (10 pts) Determine a value of x that satisfies the conclusion of the *Mean Value Theorem* for f over the interval $[1,4]$ if $f(x) = x + \sqrt{x}$

2. (7 pts) Apply three iterations of *Newton's Method of Approximation* to approximate the x -coordinate of the point of intersection between the graphs of $y = \ln x$ and $y = -x + 2$

3. (17 pts) Clearly sketch the graph of $y = x^3 - x$ and label in your graph all intercepts, local extrema, inflection points, and asymptotes

4. (17 pts) A Montanan rancher encloses a rectangular region bordering a river with fencing material that is not necessary against the river, but costs \$2/ft for the fencing material that is perpendicular to the river and costs \$3/ft for the fencing material that is parallel to the river. If the area of the enclosed region is to be 2000 ft^2 , then what dimensions of this rectangular region minimize the cost?



5. (17 pts) Clearly sketch the graph of $y = x^{\frac{6}{5}} - x^{\frac{1}{5}}$ and label in your graph all intercepts, local extrema, inflection points, and asymptotes

6. (17 pts) Determine the dimensions of the right circular cylinder inscribed in a sphere of radius r that has maximum volume.

7. (17 pts) Clearly sketch the graph of $y = \frac{x-2}{(x+2)^2}$ and label in your graph all intercepts, local extrema, inflection points, and asymptotes