

1. Compute the linearization of $f(x) = 1/x$ at $x = 2$.
2. Use your linearization to estimate $1/3$.
3. Draw a graph that illustrates the computation you just did. Then use the graph to determine if your estimate for $1/3$ is an underestimate or an overestimate.

4. On what intervals is the function increasing? Decreasing?
5. Find the critical points of $f(x)$.
6. Use the first derivative test to classify the only positive critical point as a local min/max/neither.
7. Use the second derivative test to classify the only positive critical point as a local min/max if this is possible

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8. A circular metal plate is being heated in an oven. The radius of the plate is increasing at a rate of 0.01 cm/min when the radius is 50cm. How fast is the area of the plate increasing?
9. A Norman window is has a rectangular base and a semi-circle on top. What dimensions of the window minimize the perimeter if the area of the window is to be 4 ft².

10. The volume of a cone is given by $V = \frac{1}{3}\pi r^2 h$ where r is the radius of the base of the cone and h is the height of the cone. Use a differential to estimate the change in volume of the cone if the height is fixed at 9 feet and the radius changes from 5 feet to 5.5 feet.

11. Compute $\lim_{x \rightarrow 0} \frac{\sec(x) - 1}{x^2}$

$$x^4 + y^4 = 2.$$

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