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.

The problems on this page refer to the function $f(x)=\frac{1}{x}+x$.
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 $\mathrm{min} / \mathrm{max} /$ neither.
7. Use the second derivative test to classify the only positive critical point as a local min/max if this is possible
8. A circular metal plate is being heated in an oven. The radius of the plate is increasing at a rate of $0.01 \mathrm{~cm} / \mathrm{min}$ when the radius is 50 cm . 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 $4 \mathrm{ft}^{2}$.
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 $\lim _{x \rightarrow 0} \frac{\sec (x)-1}{x^{2}}$

