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 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

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 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 $\lim_{x \to 0} \dfrac{\sec(x) - 1}{x^2}$

12. Consider the curve defined implicitly by

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

a. Show that the point $(1, 1)$ lies on this curve.

b. Find the slope of the tangent line to the curve at this point.