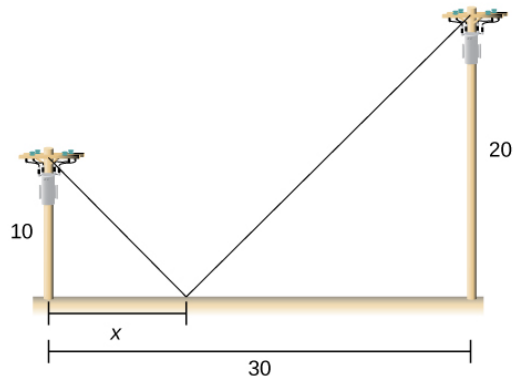


1. (10 p) Two poles are connected by a wire that is also connected to the ground. The first pole is 20 m tall and the second pole is 10 m tall. There is a distance of 30 m between the two poles. Where should the wire be anchored to the ground to minimize the amount of wire needed?



2. Consider the following function: $f(x) = x^2 \ln x$.

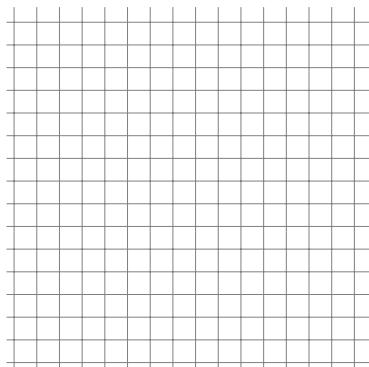
(a) (2 p) $D_f =$

(b) (3 p) $\lim_{x \rightarrow \infty} x^2 \ln x =$

(c) (3 p) $\lim_{x \rightarrow -\infty} x^2 \ln x =$

(d) (4 p) Find the local extreme values of $f(x)$.

(e) (2 p) Sketch the graph of the function (first, you have to define the axes).



3. The velocity of a moving particle is described by the following function: $v(t) = 5 \cdot \sin(2\pi t)$, where t is measured in seconds and v is measured in m/s.

(a) (5 p) Find the total displacement between $t = 0$ and $t = 4$.

(b) (5 p) Find the total distance travelled between $t = 0$ and $t = 4$.

4. Evaluate the following integrals:

(a) (5 p) $\int \frac{e^{3x}}{10 + 4 \cdot e^{3x}} dx$

(b) (5 p) $\int_{-1}^{3/2} \frac{1}{4x^2 + 8x + 29} dx$

5. (8 p) Find the area between the curves: $f(x) = \frac{4}{x}$ and $g(x) = 5 - x$.

6. (8 p) Find the tangent line(s) to $f(x) = \frac{x+1}{x-5}$ with slope $m = -6$.