

9. (9 points) An ecologist is studying the biodiversity of an environment near the top edge of a windswept cliff. One statistic of interest to her is the distribution of biomass throughout the environment. If x measures the horizontal distance from the cliff edge in meters, there is only one species of tussock grass that grows for $1 \leq x \leq 20$. Along the first meter from the cliff's edge, nothing grows; and beyond 20 meters from the cliff, various other plant species thrive.

A typical tussock grass plant located x meters from the cliff edge has mass $\frac{2}{9}x^3 + \frac{3}{2}x^2 + 3$ kilograms per plant, and there will be $\frac{1}{2x^2}$ such plants per square meter.

(a) For $1 \leq x \leq 20$, find the distance from the cliff which minimizes the biomass per square meter. Show your work.

At a distance of _____ from the cliff's edge the biomass per square meter is minimized.

(b) What is the maximal biomass per square meter in this region? Explain.

The maximal biomass per square meter in this region is _____.