Math 1400 Calculus for Social and Life Sciences I Name:_____
Quiz 5

You have **10 minutes** to complete this quiz. This quiz is worth a total of 10 points. Please write **clearly and neatly** and make sure to **show your work** unless otherwise specified. Correct answers with no supporting work may receive reduced/no credit.

---

1. (10 points) A cylindrical can of soda contains 355 milliliters, which is 355 cm^3. Find the dimensions (height and radius) that minimize the amount of material needed to make the can. *A cylinder is a prism with a circular base. Therefore the volume is the area of the circular base (πr^2) times the height. The surface area* ***of the curved part*** *of a cylinder can be found by multiplying the perimeter of the circular base ($2\pi r$) by the height.*

   (a) (1 point) What are you trying to minimize? _____

   (b) (2 points) *Draw a picture,* then write a formula for the **total** surface area of the can.

   (c) (1 points) Write a formula for the volume of the can.

   (d) (2 points) Rewrite your formula for the surface area as a function of **only** the radius.

   (e) (3 points) Find the radius that maximizes the surface area. *For this problem, you may take it for granted that the critical point you find is actually the maximum.*

   (f) (1 point) What is the height of the can?

Math 1400 Calculus for Social and Life Sciences I Name:_____
Quiz 5

You have **10 minutes** to complete this quiz. This quiz is worth a total of 10 points. Please write **clearly and neatly** and make sure to **show your work** unless otherwise specified. Correct answers with no supporting work may receive reduced/no credit.

---

1. (10 points) A cylindrical can of soda contains 12 fluid oz, which is about 21.6 in^3. Find the dimensions (height and radius) that minimize the amount of material needed to make the can. *A cylinder is a prism with a circular base. Therefore the volume is the area of the circular base (πr^2) times the height. The surface area* ***of the curved part*** *of a cylinder can be found by multiplying the perimeter of the circular base ($2\pi r$) by the height.*

   (a) (1 point) What are you trying to minimize? _____

   (b) (2 points) *Draw a picture,* then write a formula for the **total** surface area of the can.

   (c) (1 points) Write a formula for the volume of the can.

   (d) (2 points) Rewrite your formula for the surface area as a function of **only** the radius.

   (e) (3 points) Find the radius that maximizes the surface area. *For this problem, you may take it for granted that the critical point you find is actually the maximum.*

   (f) (1 point) What is the height of the can?