

Name:

Math 116 Exam 1

February 8, 2022

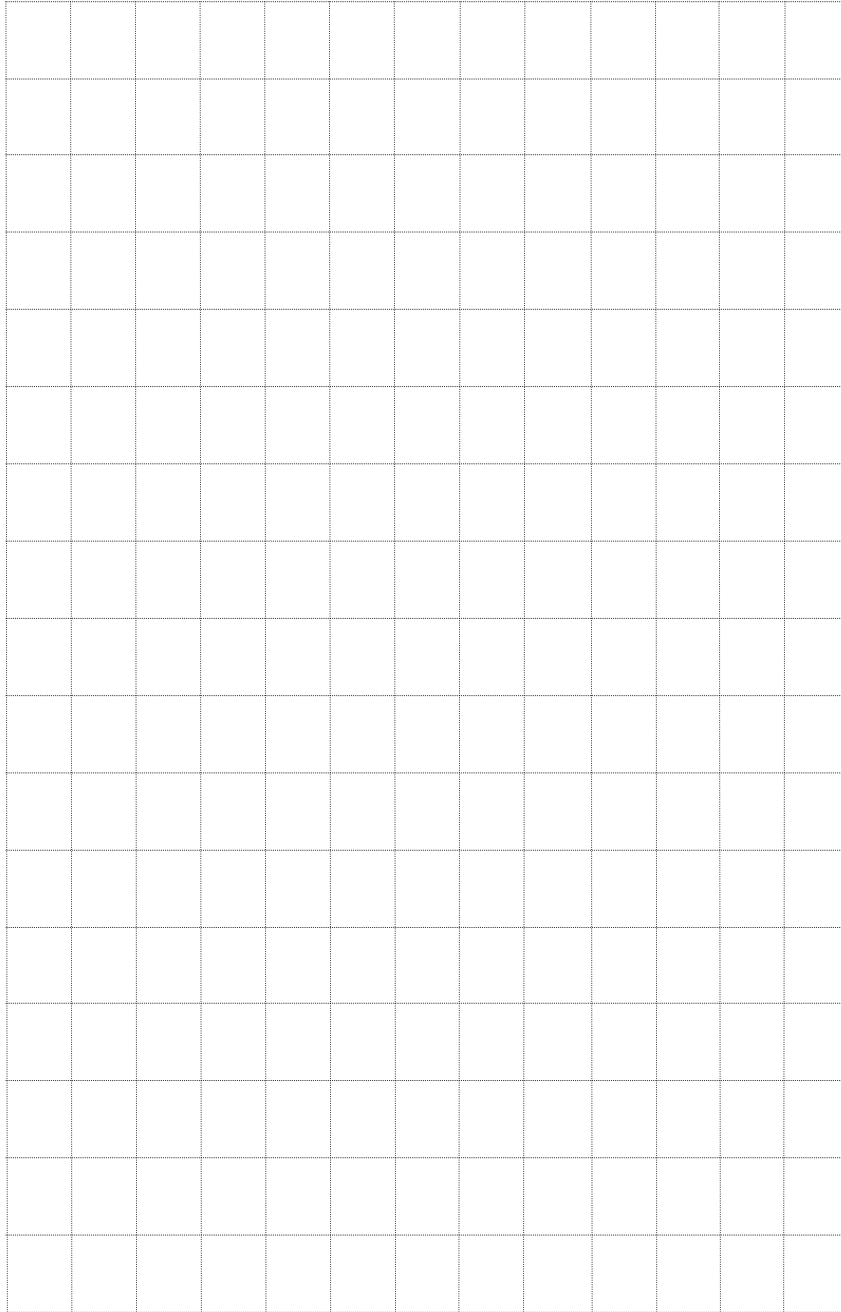
Directions:

1. WRITE YOUR NAME ON THIS TEST!
2. Except where indicated, merely finding the answer to a problem is not enough to receive full credit; you must show how you arrived at that answer.
3. Unless otherwise indicated, DO NOT convert irrational numbers such as $\sqrt{3}$ or π into decimal approximations; just leave them as they are.
4. If you have a question, raise your hand or come up and ask me.

1) Starting with the initial condition $y(0) = -1$ (i.e. start at $(0, -1)$), use three iterations of Euler's Method with $\Delta x = 1$ to sketch a solution to

$$\frac{dy}{dx} = \sin(\pi x) - y.$$

There is some graph paper on the next page if you need it.



2) Find the area enclosed by the curves $y = x^2$ and $y = 2x + 3$.

3) Sasquatch wants to eat a Hot Pocket[®] he got from his friend Bigfoot. Since he acquired a microwave, he follows the directions and cooks it on high for 2 minutes. When he takes it out, his discerning senses register a blistering temperature of 200° F around the edges (we all know it is cold in the middle) and his kitchen is a pleasant 72° F. Let $x(t)$ denote the temperature of the Hot Pocket[®], where t is measured in minutes.

a) Suppose someone tells you that $x(5) = 68^\circ$ F. Without solving for $x(t)$, explain whether or not this is possible.

b) Find an equation for $\frac{dx}{dt}$ in terms of $x(t)$, plugging in all relevant numbers.

c) If the Hot Pocket[®]'s edge is 150° after 1 minute, how long will Sasquatch have to wait until it has cooled to 120°, when he will begin eating it? There had better be some calculus on this part!

4) A sphere of radius 5 cm has a hole bored through its center of radius 3 cm.

a) Determine a formula, using calculus, for the volume remaining after the hole has been bored out.

b) Find the volume remaining after the hole has been bored out.