

MATH 1200 Worksheet 3 DUE May 4 Name:

1. Find all the critical points (x,y) for the function $f(x) = \ln(x^3 - 8x + 20)$.

2. The DU Hula Hoop team is a growing (if imaginary) club on campus. The team offers new members a comprehensive training session in proper hula hoop technique. It is determined that t weeks after basic training, a Hula Hoop team member can perform

$$Q(t) = 200 - 95e^{-kt}$$

hula hoop spins in a minute. A member with 5 weeks of experience can perform 130 spins per minute.

FOR THIS PROBLEM, BE SURE TO INCLUDE APPROPRIATE UNITS.

- a. Determine the value of k (to seven decimal places) so that you can write a function $Q(t)$ (with no other variables in it) that will give the number of spins a team member can perform in a minute after t weeks of experience.
- b. How many spins can the average member perform in a minute right after completing training?
- c. How many spins can a team member with 3 weeks experience perform in a minute? Round your answer to the nearest spin.
- d. At what **rate** is a team member's hula hoop speed increasing 3 weeks after basic training? Round your answer to 2 decimal places.

e. How long has a member been with the team if that member can perform 180 spins in a minute?

f. According to the model, what is the most possible spins a team member can perform in a minute?

3. Let $G(x) = (x^3 + 1)(x - 2) - x$

a. Find the critical points for $G(x)$. Give the answer as a list of points of the form (x, y) .

b. Determine the **intervals on which $G(x)$ is increasing and decreasing**, then use the First Derivative Test to determine whether each critical point corresponds to **relative maximum or a relative minimum** or no extremum, for $G(x)$.

To get full credit, **include a sign chart for $G'(x)$ and indicate the numbers you tested**. Summarize any extrema you find in the table at the bottom.

Increasing:	Decreasing:
Relative Maxima:	
Relative Minima:	