

Name: _____

1. **Do not open this booklet until you are told to do so.**
 2. Try not to separate the pages. If they do become separated, write your names on every page and point this out to your proctor when you hand it in.
 3. Show an appropriate amount of work (including appropriate explanation) for each problem and not just the final answer. Include units in your answer where that is appropriate.
 4. You may use any calculator functionally equivalent to a TI-83/TI-83+ or TI-84/TI-84+. Use of calculators with more functionality than these is not allowed.
 5. **Turn off all cell phones and pagers, and remove all headphones.**
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Proficiency Level on Module 1: _____

Problem 1

(I) Find the natural domain of the function $f(x) = \sqrt{\frac{2-x}{x+3}}$

(II) Suppose that the function T has period 5 and that $T(0) = 2$.

(a) Which of the following function values are equal : $\{T(-6), T(4), T(13), T(19), T(28)\}$.

(b) Let $U(r) = T(0.5r)$.

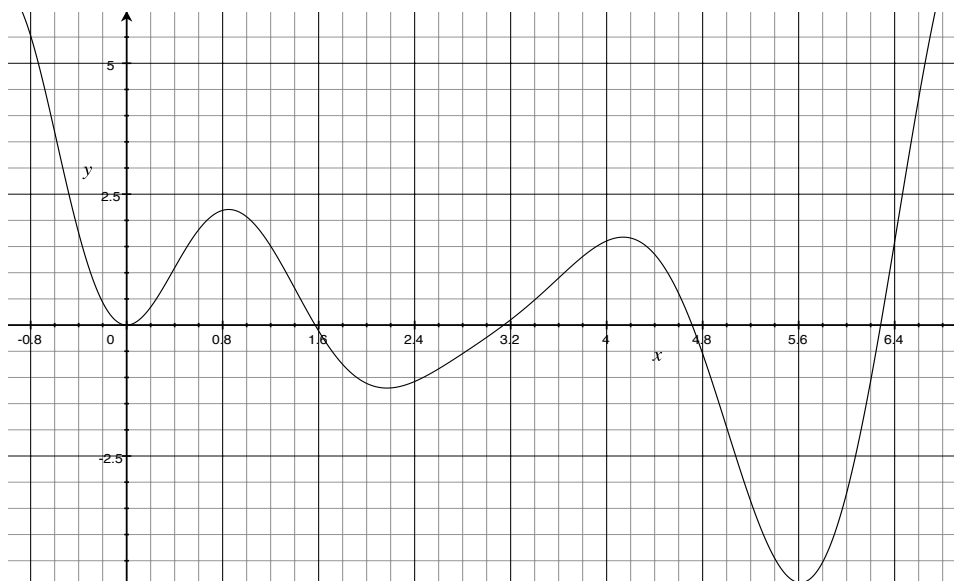
(1) What is the period of U and why?

(2) $U(10) = 2$. TRUE or FALSE? Explain your answer

Problem 2

Suppose that the line tangent to the curve $y = f(x)$ at $x = 3$ passes through the points $(-2, 3)$ and $(4, -1)$. Find $f(3)$ and $f'(3)$. If $f'(x) \leq f'(3)$ for all x , use the speed limit law to show that $f(2) \geq f(3)$.

Problem 3 The figure below is the graph of the function $f'(x)$. In the problems which follow please explain your answers.



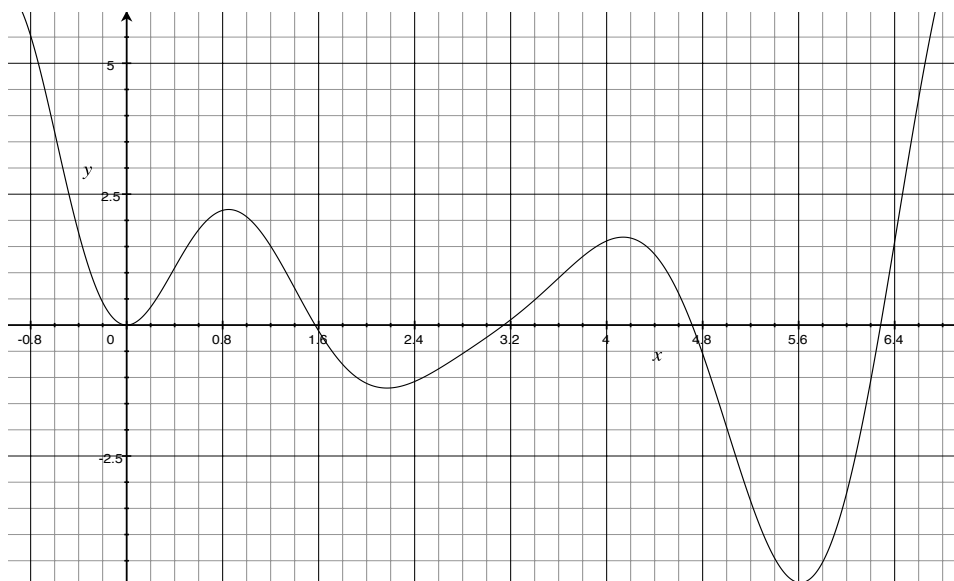
(a) Find the stationary points of $f(x)$.

(b) What are the local minimum and maximum points of $f(x)$?

(c) On which interval is $f(x)$ concave up?

(c) On which interval is $f''(x) < 0$?

Problem 4 Now let the figure below refer to the graph of the function $f''(x)$. In the problems which follow please explain your answers.



- (a) Where is $f(x)$ concave up?
- (b) Where is $f'(x)$ decreasing?
- (c) Find the inflection points of $f(x)$?

Problem 5 The figure shows the graph of f' . Sketch a graph of f on the same axis.

