WORKSHEET: DERIVATIVES AND LOCAL EXTREMUMS 2

Names and student IDs: _____

Recall that a differentiable function f is increasing on (a, b) exactly when $f'(x) \geq 0$ on (a, b), and that f is decreasing on (a, b) exactly when $f'(x) \leq 0$ on (a, b).

Let $k(x) = -x^3 - 9x^2 + 21x + 2$. We are going to identify the open intervals on which k is increasing, those on which k is decreasing, and all critical points, local minimums, and local maximums.

Recall that x is a critical point if $k'(x) = 0$ or $k'(x)$ does not exist.

1. Find $k'(x)$.

2. Find all critical points of k. (You should find two of them, both integers.)

3. Find the possible open intervals of increase and decrease for k. (There should be three such intervals.)

4. For each of the intervals above, determine whether k is increasing or decreasing on that interval.

5. Use the information above to determine, for each critical point, whether it is a local minimum or local maximum for k.

6. Use the second derivative test to determine, for each critical point, whether it is a local minimum or local maximum for k.

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