MATH 251 (PHILLIPS): SOLUTIONS TO WRITTEN HOMEWORK 8 PART 2

This homework sheet is due in class on Wednesday 28 May 2025 (week 9), in class. Write answers on a separate piece of 8.5 by 11 inch paper, well organized and well labelled, with each solution starting on the left margin of the page. Or, print a 2-sided copy of this page and write on it.

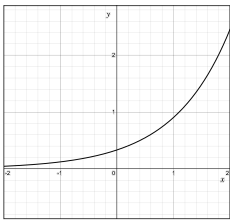
All the requirements in the sheet on general instructions for homework apply. In particular, show your work (unlike WeBWorK), give exact answers (not decimal approximations), and **use correct notation.** (See the course web pages on notation.) Some of the grade will be based on correctness of notation in the work shown.

4 points per graph, total 32 points.

Draw eight graphs of continuous functions defined on the interval $(-2, 2)$, one for each of the following lists of properties. (Each possible combination of signs of $f(x)$, $f'(x)$, and $f''(x)$ occurs.)

1. $f(x) > 0$ on $(-2, 2)$, $f'(x) > 0$ on $(-2, 2)$, and $f''(x) > 0$ on $(-2, 2)$.

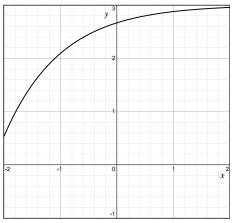
Solution. There are many possibilities. Here is one:



□

2. $f(x) > 0$ on $(-2, 2)$, $f'(x) > 0$ on $(-2, 2)$, and $f''(x) < 0$ on $(-2, 2)$.

Solution. There are many possibilities. Here is one:



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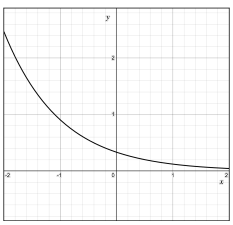
3. $f(x) > 0$ on $(-2, 2)$, $f'(x) < 0$ on $(-2, 2)$, and $f''(x) > 0$ on $(-2, 2)$.

Solution. There are many possibilities. Here is one:



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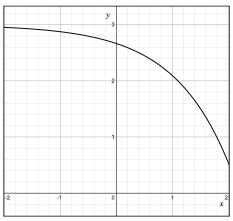
4. $f(x) > 0$ on $(-2, 2)$, $f'(x) < 0$ on $(-2, 2)$, and $f''(x) < 0$ on $(-2, 2)$.

Solution. There are many possibilities. Here is one:



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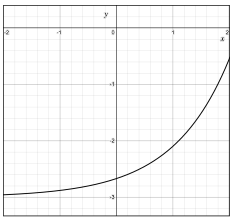
5. $f(x) < 0$ on $(-2, 2)$, $f'(x) > 0$ on $(-2, 2)$, and $f''(x) > 0$ on $(-2, 2)$.

Solution. There are many possibilities. Here is one:



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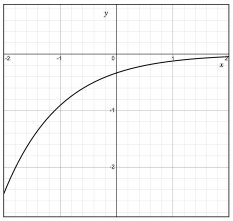
6. $f(x) < 0$ on $(-2, 2)$, $f'(x) > 0$ on $(-2, 2)$, and $f''(x) < 0$ on $(-2, 2)$.

Solution. There are many possibilities. Here is one:



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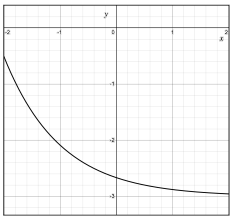
7. $f(x) < 0$ on $(-2, 2)$, $f'(x) < 0$ on $(-2, 2)$, and $f''(x) > 0$ on $(-2, 2)$.

Solution. There are many possibilities. Here is one:



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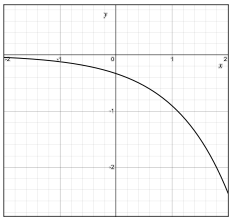
8. $f(x) < 0$ on $(-2, 2)$, $f'(x) < 0$ on $(-2, 2)$, and $f''(x) < 0$ on $(-2, 2)$.

Solution. There are many possibilities. Here is one:



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