

MATH 101 – Quiz 4

November 20th

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NOTE: Show all your work. Explain your reasoning fully with well-formed mathematical sentences and using correct notation. Organize your solution on the page properly. Write clearly and cleanly.

Problem.[10 points] Let $f(x) = \frac{x^2-2x+4}{x-2}$. Then we have $f'(x) = 1 - \frac{4}{(x-2)^2}$ and $f''(x) = \frac{8}{(x-2)^3}$. For the function $f(x)$, complete the following tasks.

- (a) Find the **domain** of the function $f(x)$.
- (b) Find the x - and y - **intercepts** of the curve $y = f(x)$.
- (c) Decide whether the function $f(x)$ is **odd**, **even**, or neither. Justify your answer.
- (d) Find the **vertical** and **horizontal** (or **slant**) **asymptotes** of the curve $y = f(x)$, if any.
- (e) Find the intervals where the function is **increasing** and **decreasing**. Find any **local maxima** and **local minima** of $f(x)$ (include their coordinates).
- (f) Find the intervals where the function is **concave up** and **concave down**. Find all **inflection points**, if any (include their coordinates).
- (g) Draw a **sign table** for $f'(x)$ and $f''(x)$ that includes all critical points and inflection points; use it to decide the qualitative **shape of the curve** between these special points.
- (h) **Sketch** the curve $y = f(x)$ on the xy -plane, using all information obtained above. Be sure to indicate intercepts, asymptotes, local extrema, inflection points and the correct concavity on each interval.