Analysis 1, Summer 2024

Written Assignment 3

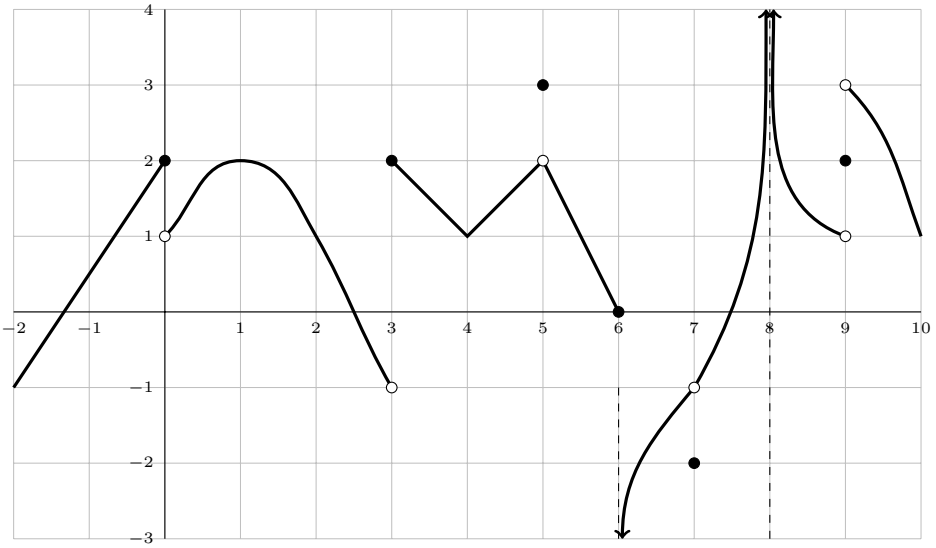
You must show your work for every task except #2.

1. Calculate $\lim\limits_{x\to 1} \dfrac{1-\sqrt{x}}{x^2-6x+5}$ and $\lim\limits_{x\to 4} \dfrac{1-\sqrt{x}}{x^2-6x+5}$.

2. Give the value—if it exists—of

   (a) $\lim\limits_{x\to \mathsf{Y}^+} f(x)$ (b) $\lim\limits_{x\to \mathsf{Y}} f(x)$ (c) $\lim\limits_{x\to \mathsf{Z}} f(x)$ (d) $f(\mathsf{Z})$

   for the function $f(x)$ whose graph is shown below, where Y and Z are the last two digits of your student ID (e.g., if your ID were 281539, then Y would be 3 and Z would be 9). You can assume any limits that are finite are integers.



3. Find all the asymptotes of $y = \dfrac{5x^2-17x-12}{2x^2-9x+4}$.

4. (a) Give the derivative of $x^3 \cdot \big(6x^2+1\big)^2$.

   (b) Give the derivative of $x^3 \cdot \sin(6x^2+1)$.

   (c) Use the fact that $\big(e^x\big)' = e^x$ to find the derivative of $x^3 \cdot e^{6x^2+1}$.

   (d) Use the fact that $\big(\ln(x)\big)' = \dfrac{1}{x}$ to find the derivative of $x^3 \cdot \ln(6x^2+1)$.