

Calculus I Quiz #2

Problem 1 Let $f(x) = \frac{4}{(x-6)^2} + 3$.

- a) What are the domain and range of $y = f(x)$?
- b) Where is $f(x)$ continuous?
- c) What are the asymptotes of $f(x)$?

For Problems 2 and 3 below, you may use that

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1, \quad \lim_{x \rightarrow 0} \frac{\cos x - 1}{x} = 0$$

and

$$\sin(x + \Delta x) = \sin(x) \cos(\Delta x) + \cos(x) \sin(\Delta x)$$

but you should already know that $\sin(0) = 0$ and $\cos(0) = 1$. If you can't calculate it in radians, just write the number plugged in, i.e. $\sin(7)$ if you're asked about $\sin(x)$ at $x = 7$ (since we don't use calculators in here). If a limit does not exist, use "DNE".

Problem 2 Evaluate the following limits.

- a) $\lim_{x \rightarrow 4} \frac{\sin(x-4)}{x}$
- b) $\lim_{x \rightarrow 5} \frac{\sin(x-5)}{(x-5)}$
- c) $\lim_{x \rightarrow -\pi/2} \frac{\sin(x)}{(x)}$
- d) $\lim_{\Delta x \rightarrow 0} \frac{\sin(x+\Delta x) - \sin x}{\Delta x}$

Problem 3 Calculate the derivatives of the following functions. Tell where the derivatives exist and where they do not.

- a) $f(x) = 6x^2 - 8x + 13$
- b) $g(x) = |(x+1)^3|$
- c) $h(x) = \begin{cases} x^3 - 2 & \text{if } x \geq 2 \\ x^3 - x & \text{if } x < 2 \end{cases}$
- d) $j(x) = [\cos(x)]^{-2} [\sin(x)]^2$