Name: ―――――――――――――――――――――   ――――― / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. **[4 points]** The temperature on a Fairbanks January morning is rapidly rising. The table below indicates the temperature in degrees Fahrenheit measured once an hour starting at some initial time $t = 0$ hours.

t (hours)	0	1	2	3	4	5
T (°F)	2	5	12	18	23	27

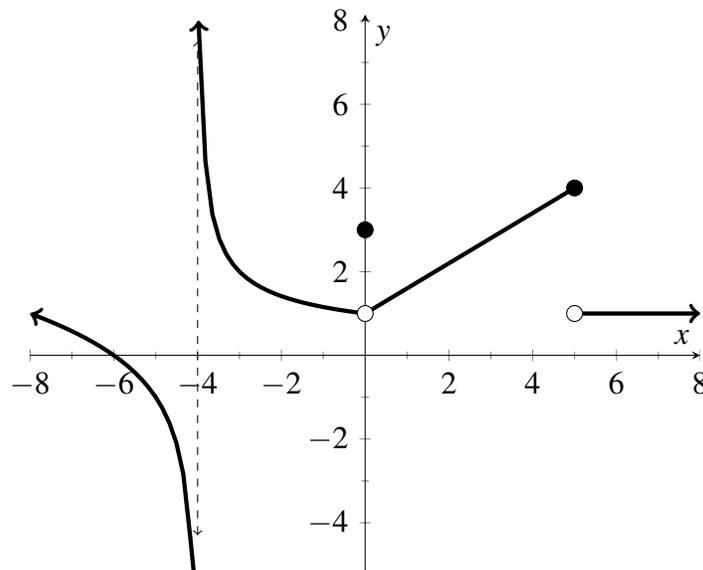   **a.** Find the average rate of change of the temperature over the entire measurement period.

$$\frac{27-2}{5-1} = \frac{25}{5} = 5\,°F/hour$$

   b. Find the average rate of change of the temperature from hour 2 to hour 4.

$$\frac{23-12}{4-2} = \frac{11}{2} = 5.5\,°F/hour$$

2. **[9 points]** Use the graph of the function of $f(x)$ to answer the following questions.

   a. $\lim_{x \to 5^+} f(x) = $ ___1___

   b. $\lim_{x \to 5^-} f(x) = $ ___4___

   c. $\lim_{x \to 5} f(x) = $ ___DNE___

   d. $f(5) = $ ___4___

   e. $f(0) = $ ___3___

   f. $f(-6) = $ ___0___

   g. $\lim_{x \to -4^+} f(x) = $ ___∞___

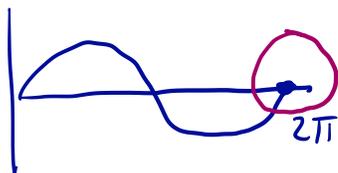   **h.** $\lim_{x \to 0} f(x) = $ ___1___

   i. $\lim_{x \to -6} f(x) = $ ___0___

3. **[6 points]** Compute the following limits. For each limit, justify your answer with a sentence or two.

a. $\displaystyle \lim_{x \to 2\pi^-} \frac{x+3}{\sin(x)} = \boxed{-\infty}$

As $x \to 2\pi$, $x+3 \to 2\pi + 3$
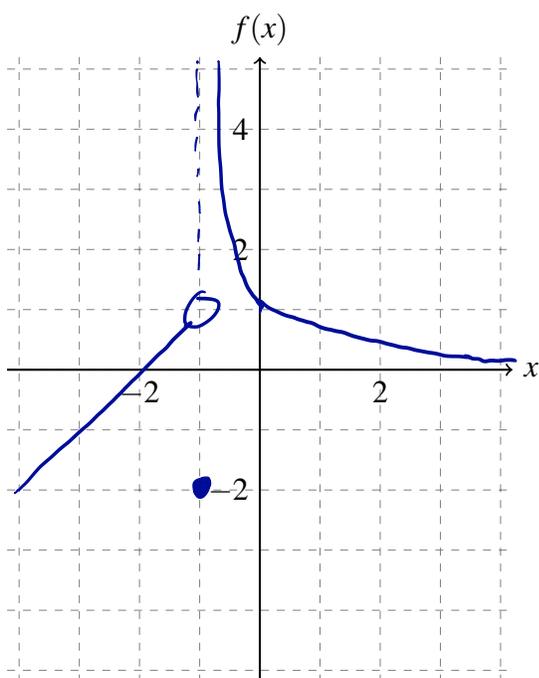
$\sin(x) \to 0^-$.

$\dfrac{2\pi+3}{0^-} \Rightarrow -\infty$

b. $\displaystyle \lim_{x \to 2^+} \frac{\sqrt{5}}{(x-2)^4} = \boxed{\infty}$

As $x \to 2^+$, $(x-2)^4 \to 0^+$ since

$(x-2)^4 \geq 0$. $5/0^+ \Rightarrow +\infty$

4. **[6 points]** On the axes below, sketch the graph of the function

$$f(x) = \begin{cases} x+2 & x < -1 \\ -2 & x = -1 \\ \frac{1}{x+1} & x > -1. \end{cases}$$

Then compute, with brief justification, the requested values in the table.

$f(x)$

Value	Justification
$f(-1) =$ -2	The function definition
$\displaystyle \lim_{x \to -1} f(x) =$ DNE	$\displaystyle \lim_{x \to 1^-} f(x) = 1$ $\displaystyle \lim_{x \to 1^+} f(x) = \infty$
$\displaystyle \lim_{x \to -1^-} f(x) =$ 1	$\displaystyle \lim_{x \to -1} x+2 = -1+2 = 1$