

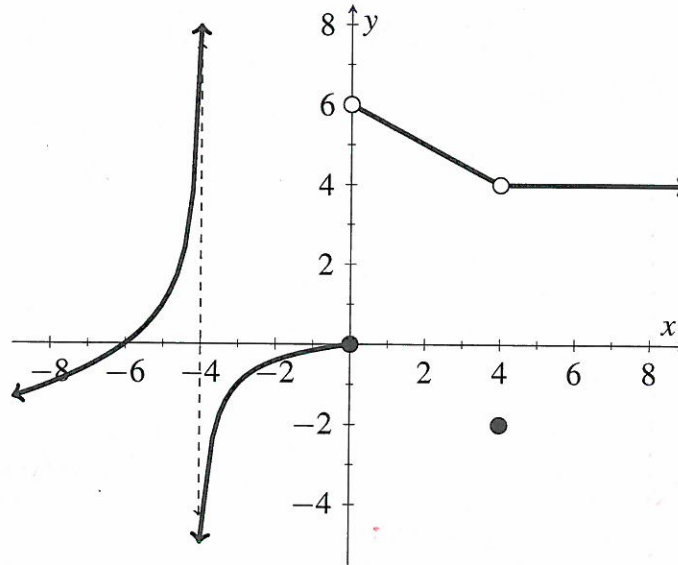
Name: _____

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Circle one: Faudree (F01) | Bueler (F02) | VanSpronsen (UX1)

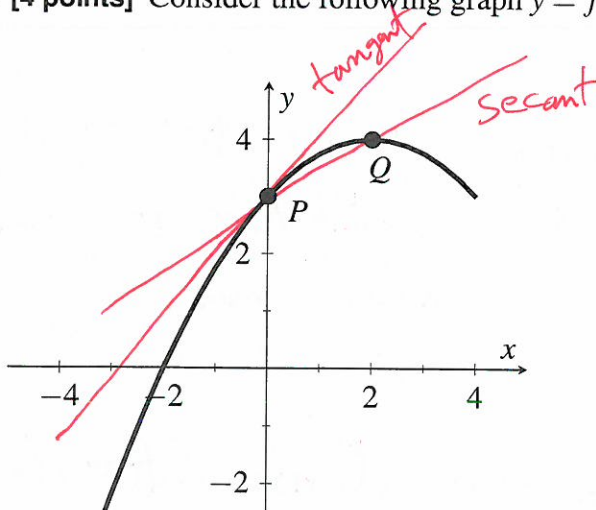
25 points possible. No aids (book, calculator, etc.) are permitted. Show all work and use proper notation for full credit.

1. [9 points] Use the graph of the function $f(x)$ to answer the following questions.



- a. $f(-6) = 0$
- b. $f(0) = 0$
- c. $f(4) = -2$
- d. $\lim_{x \rightarrow 0^+} f(x) = 6$
- e. $\lim_{x \rightarrow 0^-} f(x) = 0$
- f. $\lim_{x \rightarrow 0} f(x) = \text{d.n.e.}$
- g. $\lim_{x \rightarrow -4^+} f(x) = -\infty$
- h. $\lim_{x \rightarrow 6} f(x) = 4$
- i. $\lim_{x \rightarrow 4} f(x) = 4$

2. [4 points] Consider the following graph $y = f(x)$.



- a. Sketch the secant line through points P and Q . (Add the line to the graph at left.)
- b. Find the slope of the secant line through the same points $P(0, 3)$ and $Q(2, 4)$.

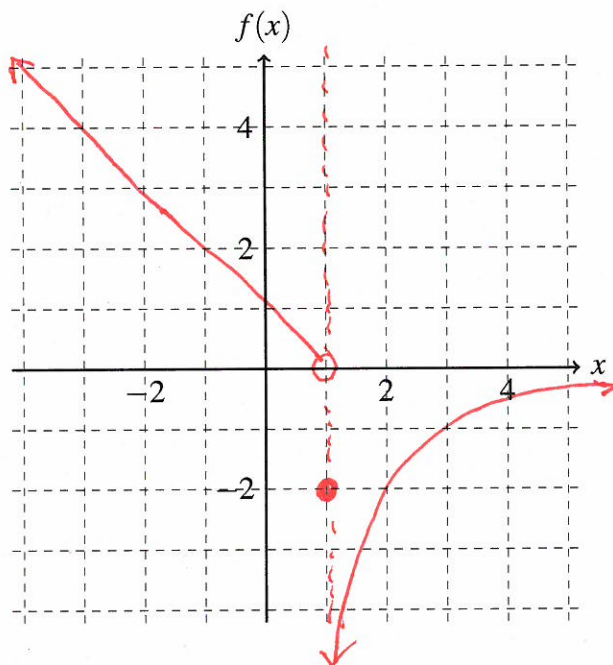
$$m = \frac{4 - 3}{2 - 0} = \frac{1}{2}$$

- c. Sketch the tangent line through point P .

3. [8 points] On the axes below, sketch the graph of the function

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

Then compute the requested values.



a. $f(1) =$ -2

b. $\lim_{x \rightarrow 1^-} f(x) =$ 0

c. $\lim_{x \rightarrow 1} f(x) =$ d.n.e.

Justify your answer to part c:

$$\left. \begin{array}{l} \lim_{x \rightarrow 1^-} f(x) = 0 \\ \lim_{x \rightarrow 1^+} f(x) = -\infty \end{array} \right\} \begin{array}{l} \text{not} \\ \text{equal} \end{array}$$

4. [4 points] Compute the following limits.

a. $\lim_{x \rightarrow 3} \frac{x-4}{(x-3)^2} =$ -∞

(because numerator ≈ -1
but denominator is positive
and small)

b. $\lim_{x \rightarrow 0^+} \frac{2}{\sin(x)} =$ +∞

(because denominator is
positive and small)