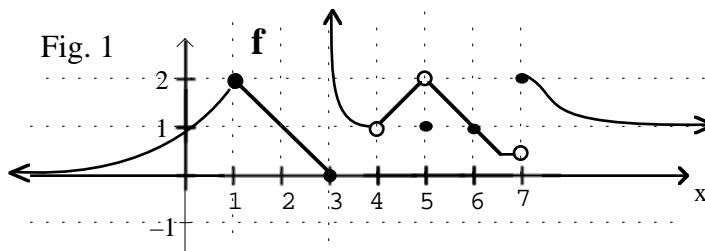


**Instructions:** Do all of your calculations on this sheet. You have 25 minutes. Good luck.

1. These limits refer to the function in Fig. 1. (1 point each)



$f(5) = \underline{\hspace{2cm}}$

$\lim_{x \rightarrow 5} f(x) = \underline{\hspace{2cm}}$

$\lim_{x \rightarrow 7} f(x) = \underline{\hspace{2cm}}$

$\lim_{x \rightarrow 3^+} f(x) = \underline{\hspace{2cm}}$

$\lim_{x \rightarrow 3^-} f(x) = \underline{\hspace{2cm}}$

$\lim_{x \rightarrow \bullet} f(x) = \underline{\hspace{2cm}}$

$\lim_{x \rightarrow 5} \frac{f(x-1)}{x-2} = \underline{\hspace{2cm}}$

$\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} = \underline{\hspace{2cm}}$

2. Evaluate the following limits. (Give answers to one decimal place.) (2 points each)

$\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 + x - 6} = \underline{\hspace{2cm}}$

$\lim_{x \rightarrow 5} \frac{|x-5|}{x-5} = \underline{\hspace{2cm}}$

$\lim_{h \rightarrow 0} \frac{7^h - 1}{h} = \underline{\hspace{2cm}}$

3. If I stand on my apartment balcony and throw an apple straight up, its elevation above the ground after  $t$  seconds is  $E(t) = 30 + 80t - 16t^2$  feet.

(a) What is the **Average** upward velocity of the apple

between  $t = 1$  seconds and  $t = 3$  seconds? \_\_\_\_\_ (include units)

(2 pts)

(b) Evaluate  $\frac{E(1+h) - E(1)}{h}$  and simplify as much as possible (so there is no  $h$  in

the denominator).  $\frac{E(1+h) - E(1)}{h} =$  \_\_\_\_\_

(3 pts)

(c) What is the **Instantaneous** upward velocity of the apple after 1 second? \_\_\_\_\_ (include units)

(1 pt)

**BONUS** (+1 point. Do only part A or only part B)

Fig. 2 shows two points on a curve.

A. If  $P$  is fixed and  $Q$  slides along the curve towards  $P$ , then the **slope** of the secant line through  $P$  and  $Q$  will (circle one)

Increase      Decrease      Stay the same

B. If the units on the horizontal axis are "meters" and the units on the vertical axis are "dollars", then the **units** of the slope of the secant line through  $P$  and  $Q$  are \_\_\_\_\_

