Alternate Solutions 13.1

#4 $f(x) = 3x+4 \qquad x=1$

$$\lim_{h\to 0} \frac{f(x+h)-f(x)}{h} = \frac{[3(x+h)+4]-[3x+4]}{h}$$

$$\lim_{h\to 0} \frac{[3x+3h+4]-[3x+4]}{h} = \frac{3x+3h+4-3x-4}{h}$$

$$\lim_{h\to 0} \frac{3h}{h} = 3$$

Since there is no h left I don't need to plug in $h=0$

And since there is no x I don't need to plug in $x=1$

Answer: 3

#5 $f(x) = 2x^2 \qquad x=-1$

$$\lim_{h\to 0} \frac{[2(x+h)^2]-[2x^2]}{h} = \frac{[2(x^2+2xh+h^2)]-[2x^2]}{h}$$

$$\lim_{h\to 0} \frac{[2x^2+4xh+2h^2]-2x^2}{h} = \frac{4xh+2h^2}{h}$$

$$\lim_{h\to 0} 4x+2h$$

Let $h=0$ $\quad 4x+2(0) = 4x$

Let $x=-1 \Rightarrow 4(-1) = \boxed{-4}$

Answer ↗

#6 $f(x) = x^2 - x$

Part c

$f(x) = x^2 - x \qquad x = 1$

$$\lim_{h \to 0} \frac{[(x+h)^2 - (x+h)] - [x^2 - x]}{h}$$

$$\lim_{h \to 0} \frac{[x^2 + 2xh + h^2 - x - h] - [x^2 - x]}{h}$$

$$\lim_{h \to 0} \frac{x^2 + 2xh + h^2 - x - h - x^2 + x}{h}$$

$$\lim_{h \to 0} \frac{2xh + h^2 - h}{h} \qquad \lim_{h \to 0} 2x + h - 1$$

Let $h = 0 \Rightarrow 2x + 0 - 1 = 2x - 1$

Let $x = 1 \Rightarrow 2(1) - 1 = \boxed{1}$ ← Answer

#7 © just use pattern from chart

(I won't ask you to use the definition on a cubic equation)