B Limits

6 9

1\. a) $$\lim_{x \to 2} \frac{(x-2)(2x+5)}{x-2}$$

$$= \lim_{x \to 2} 2x+5$$

$$= 9$$

b) $$\lim_{x \to \infty} \frac{\frac{5x^2}{x^2} + \frac{x}{x^2} - \frac{3}{x^2}}{\frac{2x^2}{x^2} - \frac{4}{x^2}}$$

$$= 5/2$$

c) $$\lim_{x \to -3} \frac{\text{Constant}}{0}$$

Test Points

x	y
-2.9	-145
-3.1	155

D.N.E

d) $$\frac{7}{3}$$

e) $$\lim_{x \to 7} \frac{\frac{7-x}{7x}}{x-7}$$

$$\lim_{x \to 7} \frac{-1(\cancel{7-x})}{7x(\cancel{7-x})}$$

$$\lim_{x \to 7} \frac{-1}{7x}$$

$$= \frac{-1}{49}$$

f) $$\lim_{x \to 0} \frac{(\sqrt{x+2}-\sqrt{2})(\sqrt{x+2}+\sqrt{2})}{x(\sqrt{x+2}+\sqrt{2})}$$

$$\lim_{x \to 0} \frac{x+2-2}{x(\sqrt{x+2}+\sqrt{2})}$$

$$\lim_{x \to 0} \frac{\cancel{x}}{\cancel{x}(\sqrt{x+2}+\sqrt{2})}$$

$$\lim_{x \to 0} \frac{1}{\sqrt{x+2}+\sqrt{2}}$$

$$= \frac{1}{2\sqrt{2}}$$

B. 1 (circled) 1 (circled)

1. g) $\lim_{x\to 5} \frac{(5-x)(5+x)}{x-5}$

$\lim_{x\to 5} \frac{-1\cancel{(5-x)}(5+x)}{\cancel{5-x}}$

$\lim_{x\to 5} -1(5+x)$

$= -10$

h) $\lim_{x\to 0} \frac{(2-(x+2))(4+2(x+2)+(x+2)^2)}{x}$

$= \lim_{x\to 0} \frac{(-x)(4+2x+4+(x+2)^2)}{\cancel{x}}$

$= \lim_{x\to 0} -1(4+2x+4+(x+2)^2)$

$= -1(4+4+(2)^2)$

$= -12.$

C Derivatives

1 a) $f'(x) = \lim_{h\to 0} \frac{\sqrt{x+h+3} - \sqrt{x+3}}{h}$

$= \lim_{h\to 0} \frac{(\sqrt{x+h+3} - \sqrt{x+3})(\sqrt{x+h+3} + \sqrt{x+3})}{h\ (\sqrt{x+h+3} + \sqrt{x+3})}$

$= \lim_{h\to 0} \frac{(x+h+3) - (x+3)}{h(\sqrt{x+h+3} + \sqrt{x+3})}$

$= \lim_{h\to 0} \frac{\cancel{h}}{\cancel{h}(\sqrt{x+h+3} + \sqrt{x+3})}$

$= \lim_{h\to 0} \frac{1}{\sqrt{x+h+3} + \sqrt{x+3}}$

$= \frac{1}{2\sqrt{x+3}}$

M_t at $x = 1$

$M_t = \frac{1}{4}$

Equation of tangent

$\frac{1}{4} = \frac{y-2}{x-1}$

$4y - 8 = x - 1$

Equation of normal

$\frac{-4}{1} = \frac{y-2}{x-1}$

$-4x + 4 = y - 2$