Limits & Continuity
1.2A – Limits by Substitution

Finding each limit by substitution. You may have to simplify first.

#1) $\lim_{x\to 9}\sqrt{x+7}$ $=\sqrt{(9)+7}$
$=\sqrt{16}$
$=4$

#2) $\lim_{x\to 2}(4x^2-7x+1)$ $=4(2)^2-7(2)+1$
$=4(4)-14+1$
$=16-13$
$=3$

#3) $\lim_{x\to 15}\frac{2x^2-30x}{x-15}$ $=\lim_{x\to 15}\frac{2x\cancel{(x-15)}}{\cancel{x-15}}$
$=\lim_{x\to 15} 2x$
$=2(15)$
$=30$

#4) $\lim_{x\to -5}\sqrt{77}$ $=\sqrt{77}$

#5) $\lim_{x\to 81}[(x-80)x^{1/2}]$ $=[(81)-80](81)^{\frac{1}{2}}$
$=[1]\cdot\sqrt{81}$
$=1\cdot 9$
$=9$

#6) $\lim_{h\to 0}(3x^2h-3xh+33)$
$=3x^2(0)-3x(0)+33$
$=33$

#7) $\lim_{h\to 5}\left[\frac{x^2-5}{x-5}+h\right]$ $=\frac{x^2-5}{x-5}+(5)$
$=\frac{x^2-5}{x-5}+5$

#8) $\lim_{x\to -5}\frac{x+5}{x^2+7x+10}$ $=\lim_{x\to -5}\frac{\cancel{x+5}}{\cancel{(x+5)}(x+2)}$
$=\lim_{x\to -5}\frac{1}{x+2}$
$=\frac{1}{(-5)+2}$
$=\frac{1}{-3}$

#9) $\lim_{x\to 0}\frac{6x^2-5x}{11x}$ $=\lim_{x\to 0}\frac{\cancel{x}(6x-5)}{11\cancel{x}}$
$=\lim_{x\to 0}\frac{6x-5}{11}$
$=\frac{6(0)-5}{11}$
$=\frac{-5}{11}$

#10) $\lim_{h\to 0}\frac{3x^2h-12xh^2+4h^3}{h}$
$=\lim_{h\to 0}\frac{\cancel{h}(3x^2-12xh+4h^2)}{\cancel{h}}$
$=\lim_{h\to 0}(3x^2-12xh+4h^2)$
$=3x^2-12x(0)+4(0)^2$
$=3x^2$

Limits & Continuity

1.2A – Limits by Substitution

Finding each limit by substitution. You may have to simplify first.

#11) $\lim\limits_{x\to 9}\sqrt{x}$

$= \sqrt{(9)}$

$= 3$

#12) $\lim\limits_{x\to 2}\left(9x^2 - 8x + 4\right)$

$= 9(2)^2 - 8(2) + 4$

$= 9(4) - 16 + 4$

$= 36 - 12$

$= 24$

#13) $\lim\limits_{x\to 4}\dfrac{2x^2 - 15}{5x + 1}$

$= \dfrac{2(4)^2 - 15}{5(4) + 1}$

$= \dfrac{2(16) - 15}{20 + 1}$

$= \dfrac{32 - 15}{21}$

$= \dfrac{17}{21}$

#14) $\lim\limits_{x\to 2}\sqrt{11}$

$= \sqrt{11}$

#15) $\lim\limits_{x\to 16}\left[(x+4)x^{-1/2}\right]$

$= \left[(16)+4\right](16)^{-\frac{1}{2}}$

$= [20] \cdot \dfrac{1}{\sqrt{16}}$

$= \dfrac{20}{4}$

$= 5$

#16) $\lim\limits_{h\to 0}\left(9x^2h - 8xh + 4\right) = 9x^2(0) - 8x(0) + 4$

$= 4$

#17) $\lim\limits_{x\to 5}\dfrac{x^2 - 25}{x - 5} = \lim\limits_{x\to 5}\dfrac{\cancel{(x-5)}(x+5)}{\cancel{x-5}}$

$= \lim\limits_{x\to 5}(x+5)$

$= (5) + 5$

$= 10$

#18) $\lim\limits_{x\to -2}\dfrac{x+2}{x^2 + 7x + 10} = \lim\limits_{x\to -2}\dfrac{\cancel{x+2}}{\cancel{(x+2)}(x+5)}$

$= \lim\limits_{x\to -2}\dfrac{1}{x+5}$

$= \dfrac{1}{(-2)+5}$

$= \dfrac{1}{3}$

#19) $\lim\limits_{x\to 0}\dfrac{x^3 + x^2 - x}{x^2 + x} = \lim\limits_{x\to 0}\dfrac{\cancel{x}(x^2+x-1)}{\cancel{x}(x+1)}$

$= \lim\limits_{x\to 0}\dfrac{x^2+x-1}{x+1}$

$= \dfrac{(0)^2 + (0) - 1}{(0)+1}$

$= \dfrac{-1}{1}$

$= -1$

#20) $\lim\limits_{h\to 0}\dfrac{8x^2h + 3xh^2 + h^3}{h}$

$= \lim\limits_{h\to 0}\dfrac{h(8x^2 + 3xh + h^2)}{h}$

$= \lim\limits_{h\to 0}(8x^2 + 3xh + h^2)$

$= 8x^2 + 3x(0) + (0)^2$

$= 8x^2$