Nayla Thahira Meldian
2311521006

KALKULUS

1.) $\lim_{x\to\infty} \frac{x}{x-5}$

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

$\lim_{x\to\infty} \frac{1}{1-\frac{5}{x}} = \frac{1}{1-0} = 1$ //

2.) $\lim_{x\to\infty} \frac{x^2}{5-x^3}$

$\lim_{x\to\infty} \frac{\cancel{x^2}}{\cancel{x^2}(\frac{5}{x^2}-x)}$

$\lim_{x\to\infty} \frac{1}{\frac{5}{x^2}-x} = \frac{1}{0-x} = 0$ //

3.) $\lim_{t\to\infty} \frac{t^2}{7-t^2}$

$\lim_{t\to\infty} \frac{\cancel{t^2}(1)}{\cancel{t^2}(\frac{7}{t^2}-1)}$

$\lim_{t\to\infty} \frac{1}{\frac{7}{t^2}-1} = \frac{1}{0-1} = -1$ //

4.) $\lim_{t\to-\infty} \frac{t}{t-5}$

$\lim_{t\to-\infty} \frac{\cancel{t}}{\cancel{t}(1-\frac{5}{t})}$

$\lim_{t\to-\infty} \frac{1}{1-\frac{5}{t}} = \frac{1}{1-0} = 1$ //

5.) $\lim_{x\to\infty} \frac{x^2}{(x-5)(3-x)}$

$\lim_{x\to\infty} \frac{\cancel{x^2}}{\cancel{x}(1-\frac{5}{x})\cancel{x}(\frac{3}{x}-1)}$

$\lim_{x\to\infty} \frac{1}{(1-\frac{5}{x})(\frac{3}{x}-1)} = \frac{1}{(1-0)(0-1)}$

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

6.) $\lim_{x\to\infty} \frac{x^2}{x^2-8x+15}$

$\lim_{x\to\infty} \frac{\cancel{x^2}}{\cancel{x^2}(1-\frac{8x}{x^2}+\frac{15}{x^2})}$

$\lim_{x\to\infty} \frac{1}{1-\frac{8}{x}+\frac{15}{x^2}} = \frac{1}{1-0+0} = 1$ //

7.) $\lim_{x\to\infty} \frac{x^3}{2x^3-100x^2}$

$\lim_{x\to\infty} \frac{\cancel{x^3}}{\cancel{x^3}(2-\frac{100x^2}{x^3})}$

$\lim_{x\to\infty} \frac{1}{2-\frac{100}{x}} = \frac{1}{2-0} = \frac{1}{2}$ //

8.) $\lim_{\theta\to-\infty} \frac{\pi\theta^5}{\theta^5-5\theta^4}$

$\lim_{\theta\to-\infty} \frac{\cancel{\theta^5}(\pi)}{\cancel{\theta^5}(1-\frac{5\theta^4}{\theta^5})}$

$\lim_{\theta\to-\infty} \frac{\pi}{1-\frac{5}{\theta}} = \frac{\pi}{1-0} = \pi$

9.) $\lim_{x\to\infty} \frac{3x^3-x^2}{\pi x^3-5x^2}$

$\lim_{x\to\infty} \frac{\cancel{x^3}(3-\frac{x^2}{x^3})}{\cancel{x^3}(\pi-\frac{5x^2}{x^3})}$

$\lim_{x\to\infty} \frac{3-\frac{1}{x}}{\pi-\frac{5}{x}} = \frac{3-0}{\pi-0} = \frac{3}{\pi}$

10.) $\lim_{\theta\to\infty} \frac{\sin^2\theta}{\theta^2-5}$

$\lim_{\theta\to\infty} \frac{\sin^2\theta \cdot \frac{1}{\theta^2}}{(\theta^2-5)\cdot\frac{1}{\theta^2}}$

$\lim_{\theta\to\infty} \frac{\sin^2\theta}{\theta^2} \cdot \frac{1}{1-\frac{5}{\theta^2}}$

$\lim_{\theta\to\infty} \frac{\sin\theta}{\theta} \cdot \lim_{\theta\to\infty} \frac{\sin\theta}{\theta} \cdot \lim_{\theta\to\infty} \frac{1}{1-\frac{5}{\theta^2}}$

$= 0 \cdot 0 \cdot \frac{1}{1-0}$

$= 0$ //

11.) $\lim_{x\to\infty} \frac{3\sqrt{x^3}+3x}{\sqrt{2x^3}}$

$\lim_{x\to\infty} \frac{\cancel{\sqrt{x^3}}(3+\frac{3}{\sqrt{x}})}{\cancel{\sqrt{x^3}}(\sqrt{2})}$

$\lim_{x\to\infty} \frac{3+\frac{3}{\sqrt{x}}}{\sqrt{2}}$

$= \frac{3+0}{\sqrt{2}} = \frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{3\sqrt{2}}{2}$ //

12.) $\lim_{x\to\infty} \sqrt{\frac{\pi x^3+3x}{\sqrt{2x^3}+7x}}$

$\sqrt[3]{\lim_{x\to\infty} \frac{\cancel{x^3}(\pi+\frac{3}{x^2})}{\cancel{x^3}\sqrt{2}+\frac{7}{x^2}}}$

$= \sqrt[3]{\frac{\pi+0}{\sqrt{7}+0}}$

$= \sqrt[3]{\frac{\pi}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}} = \sqrt[3]{\frac{\pi\sqrt{2}}{2}} = \sqrt[6]{\frac{32\pi^2}{2}}$

13.) $\lim_{x\to\infty} \sqrt{\frac{1+8x^2}{x^2+4}}$

$\sqrt[3]{\lim_{x\to\infty} \frac{1+8x^2}{x^2+4}}$

$\sqrt[3]{\lim_{x\to\infty} \frac{\cancel{x^2}(\frac{1}{x^2}+8)}{\cancel{x^2}(1+\frac{4}{x^2})}}$

$\sqrt[3]{\lim_{x\to\infty} \frac{\frac{1}{x^2}+8}{1+\frac{4}{x^2}}} = \sqrt[3]{\frac{0+8}{1+0}} = \sqrt[3]{8} = 2$ //

14.) $\lim_{x\to\infty} \sqrt{\frac{x^2+x+3}{(x-1)(x+1)}}$

$\sqrt{\lim_{x\to\infty} \frac{x^2+x+3}{(x-1)(x+1)}}$

$\sqrt{\lim_{x\to\infty} \frac{x^2+x+3}{x^2-1^2}}$

$\sqrt{\lim_{x\to\infty} \frac{\cancel{x^2}(1+\frac{x}{x^2}+\frac{3}{x^2})}{\cancel{x^2}(1-\frac{1}{x^2})}}$

$\sqrt{\lim_{x\to\infty} \frac{1+\frac{1}{x}+\frac{3}{x^2}}{1-\frac{1}{x^2}}} = \sqrt{\frac{1+0+0}{1-0}} = \sqrt{1} = 1$ //

15.) $\lim_{n\to\infty} \frac{n}{2n+1}$

$\lim_{n\to\infty} \frac{\cancel{n}}{\cancel{n}(2+\frac{1}{n})}$

$\lim_{n\to\infty} \frac{1}{2+\frac{1}{n}} = \frac{1}{2+0} = \frac{1}{2}$ //

16.) $\lim_{n\to\infty} \frac{n^2}{n^2+1}$

$\lim_{n\to\infty} \frac{\cancel{n^2}}{\cancel{n^2}(1+\frac{1}{n^2})}$

$\lim_{n\to\infty} \frac{1}{1+\frac{1}{n^2}}$

$\frac{1}{1+0} = 1$ //

17) $\lim_{n\to\infty} \frac{n^2}{n+1}$

$\lim_{n\to\infty} \frac{\cancel{n}(n)}{\cancel{n}(1+\frac{1}{n})}$

$\lim_{n\to\infty} \frac{n}{1+\frac{1}{n}} = \infty$

18) $\lim_{n\to\infty} \frac{n}{n^2+1}$

$\lim_{n\to\infty} \frac{\cancel{n}}{\cancel{n}(n+\frac{1}{n})}$

$\lim_{n\to\infty} \frac{1}{n+\frac{1}{n}} = \frac{1}{n+0} = \frac{1}{\infty} = 0$

19) $\lim_{x\to\infty} \frac{2x+1}{\sqrt{x^2+3}}$

$\lim_{x\to\infty} \frac{\cancel{x}(2+\frac{1}{x})}{\cancel{x}\sqrt{1+\frac{3}{x^2}}}$

$\lim_{x\to\infty} \frac{2+\frac{1}{x}}{\sqrt{1+\frac{3}{x^2}}} = \frac{2+0}{\sqrt{1+0}} = \frac{2}{1} = 2$ //

20) $\lim_{x\to\infty} \frac{\sqrt{2x+1}}{x+4}$

$\lim_{x\to\infty} \frac{\cancel{x}\sqrt{\frac{2}{x}+\frac{1}{x^2}}}{\cancel{x}(1+\frac{4}{x})}$

$\lim_{x\to\infty} \frac{\sqrt{\frac{2}{x}+\frac{1}{x^2}}}{1+\frac{4}{x}} = \frac{\sqrt{0+0}}{1+0} = 0$ //

21.) $\lim_{x\to\infty} \sqrt{2x^2+3} - \sqrt{2x^2-5} \cdot \frac{\sqrt{2x^2+3}+\sqrt{2x^2-5}}{\sqrt{2x^2+3}+\sqrt{2x^2-5}}$

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

$\lim_{x\to\infty} \frac{8}{\sqrt{2x^2+3}+\sqrt{2x^2-5}}$

$\lim_{x\to\infty} \frac{\cancel{x}(\frac{8}{x})}{\cancel{x}\left(\sqrt{2+\frac{3}{x^2}}+\sqrt{2-\frac{5}{x^2}}\right)}$

$\lim_{x\to\infty} \frac{\frac{8}{x}}{\sqrt{2+\frac{3}{x^2}}+\sqrt{2-\frac{5}{x^2}}} = \frac{0}{\sqrt{2}+\sqrt{2}}$

$= 0$ //

22.) $\lim_{x\to\infty} \sqrt{x^2+2x} - x \cdot \frac{\sqrt{x^2+2x}+x}{\sqrt{x^2+2x}+x}$

$\lim_{x\to\infty} \frac{\cancel{x^2}+2x-\cancel{x^2}}{\sqrt{x^2+2x}+x}$

$\lim_{x\to\infty} \frac{2x}{\sqrt{x^2+2x}+x}$

$\lim_{x\to\infty} \frac{\cancel{x}(2)}{\cancel{x}\left(\sqrt{1+\frac{2}{x}}+1\right)}$

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

23.) $\lim_{y\to-\infty} \frac{9y^3+1}{y^2-2y+2}$

$\lim_{y\to-\infty} \frac{\cancel{y^2}(9y+\frac{1}{y^3})}{\cancel{y^2}(1-\frac{2y}{y^2}+\frac{2}{y^2})}$

$\lim_{y\to-\infty} \frac{9y+\frac{1}{y^3}}{1-\frac{2}{y}+\frac{2}{y^2}}$

$\frac{9y+0}{1-0+0} = 9(-\infty) = -\infty$