6. $\lim_{x\to-\infty}\left(5+\frac{1}{x^2}\right)$ TOP / BOTTOM

$= 5 + \frac{1}{(-\infty)^2}$

$= 5 + \frac{1}{\infty^2}$

$= \boxed{5}$

HORIZONTAL ASYMPTOTES

CASE 1: DEGREE OF TOP IS LARGER

H.A.: NONE

CASE 2: DEGREE OF BOTTOM IS LARGER

H.A.: $y=0$

CASE 3: DEGREES ARE SAME

ex: $f(x) = \frac{4x^3-2}{7x-9x^3}$

H.A. $y = \frac{4}{-9}$

7. $f(x) = \frac{8x+2}{4x-3}$

H.A.: $y = \frac{8}{4}$

$\boxed{y=2}$

8. $f(x) = \frac{3x}{x^2-1}$

H.A.: $\boxed{y=0}$

9. $f(x) = \frac{x^3-5x+2}{x^2+4x-2}$

H.A.: $\boxed{\text{NONE}}$

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

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

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

$= \frac{\frac{1}{\infty}+\frac{3}{\infty^3}}{1-\frac{1}{\infty^3}}$

$= \frac{0+0}{1-0} = \boxed{0}$

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

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

$= \lim_{x\to\infty}\frac{1+\frac{3}{x^2}}{2-\frac{5}{x^2}}$

$= \frac{1+\frac{3}{\infty^2}}{2-\frac{5}{\infty^2}}$

$= \frac{1+0}{2-0}$

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

12. $\lim_{x\to\infty}\frac{7x^3-4x+3}{2x^2-5}$

$= \lim_{x\to\infty}\frac{\frac{7x^3}{x^2}-\frac{4x}{x^2}+\frac{3}{x^2}}{\frac{2x^2}{x^2}-\frac{5}{x^2}}$

$= \lim_{x\to\infty}\frac{7x-\frac{4}{x}+\frac{3}{x^2}}{2-\frac{5}{x^2}}$

$= \frac{7(\infty)-\frac{4}{\infty}+\frac{3}{\infty^2}}{2-\frac{5}{\infty^2}}$

$= \frac{7\infty}{2}$

$= \boxed{\infty}$