

## Limits Questions Review Sheet

1. Determine the limits of the following functions using a graphing approach or show enough work to justify that the limit does not exist

a)  $\lim_{x \rightarrow -3} \frac{1}{x+3}$

b)  $\lim_{x \rightarrow -4} \frac{x^2 + 5x + 4}{x^2 - 5x - 36}$

c)  $\lim_{x \rightarrow 3} \frac{1}{x^2 + 2x - 3}$

d)  $\lim_{x \rightarrow 2} \frac{2x-1}{x+3}$

2. Determine the limits of the following functions using an algebraic approach or show enough work to justify that the limit does not exist

a)  $\lim_{x \rightarrow -2} \frac{x^2 + 4x + 4}{x^2 + 5x + 6}$

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

c)  $\lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{x^2 - 10x + 9}$

d)  $\lim_{x \rightarrow 7} \frac{\sqrt{2x+2} - \sqrt{x+9}}{\sqrt{4x-12} - \sqrt{3x-5}}$

e)  $\lim_{x \rightarrow 5} \frac{\sqrt{x^2 + 11} - \sqrt{x+31}}{x-5}$

f)  $\lim_{x \rightarrow 5} \frac{\sqrt[3]{x-4} - 1}{x-5}$

g)  $\lim_{x \rightarrow 3} \frac{\sqrt{x+6} - 3}{\sqrt[3]{x+122} - 5}$

h)  $\lim_{x \rightarrow 4} \frac{\sqrt[3]{x+23} - 3}{\sqrt{x} - 2}$

i)  $\lim_{x \rightarrow 7} \frac{\sqrt[3]{x+209} - 6}{\sqrt{x+9} - 4}$

j)  $\lim_{x \rightarrow 702} \frac{\sqrt{x-621} - 9}{\sqrt[3]{x+27} - 9}$

k)  $\lim_{x \rightarrow \infty} \frac{3x^3 + 2x - 1}{x^3 - 4x^2 + x + 2}$

l)  $\lim_{x \rightarrow \infty} \frac{2x^2 - 15x + 4}{3x^3 + x}$

m)  $\lim_{x \rightarrow \infty} \frac{12x^4 - 11x}{4x^2 + x + 2}$

n)  $\lim_{x \rightarrow -4} \frac{2x+8}{|x+4|}$

o)  $\lim_{x \rightarrow \infty} \frac{15^x}{3^x}$

p)  $\lim_{x \rightarrow \infty} \frac{4x-1}{\sqrt{x^2+12}}$

q)  $\lim_{x \rightarrow -\infty} \frac{4x-1}{\sqrt{x^2+12}}$

3. Given that  $\lim_{x \rightarrow 3} \frac{x^3 + 2x^2 + ax - 3}{x^2 - 4x + 3}$  exists, determine the value of  $a$

### Answers:

1a) does not exist; b)  $\frac{3}{13}$ ; c)  $\frac{1}{12}$ ; d)  $\frac{3}{5}$

2a) 0; b)  $\frac{25}{7}$ ; c)  $\frac{1}{48}$ ; d) 1; e)  $\frac{3}{4}$ ; f)  $\frac{1}{3}$ ; g)  $\frac{25}{2}$ ; h)  $\frac{4}{27}$ ; i)  $\frac{2}{27}$ ; j)  $\frac{27}{2}$ ; k) 3; l) 0; m)  $\infty$ ;

n) does not exist; o)  $\infty$ ; p) 4; q) -4

3.  $a = -14$