1) $f(x) = \frac{x^2-5x+6}{x-3} = \frac{(x-3)(x-2)}{(x-3)}$ $g(x) = x-2$	2) $f(x) = \frac{x^2-5}{x-\sqrt{5}} = \frac{(x+\sqrt{5})(x-\sqrt{5})}{x-\sqrt{5}}$ $g(x) = x+\sqrt{5}$	3) $f(x) = \frac{x^3+8}{x+2} = \frac{(x+2)(x^2+2x+4)}{x+2}$ $g(x) = x^2+2x+4$
4) a) $\lim_{x\to -3^-} \frac{-3x}{x+3} = -\infty$ b) $\lim_{x\to -3^+} \frac{-3x}{x+3} = \infty$	5) $f(x) = \frac{x^2-10x}{x+9}$ $f(x)$ has a vertical asymptote of $x=-9$.	$\lim_{x\to -9^-} f(x) = -\infty$ $\lim_{x\to -9^+} f(x) = \infty$

6)

$$f(x) = \frac{x^2-4}{(x^2+3x+2)} = \frac{(x+2)(x-2)}{(x+2)(x+1)}$$

a) $f(x)$ has a removable discontinuity @ $x=-2$
$f(x)$ has an infinite discontinuity @ $x=-1$

Note: $x=2$ is an x-int of $f(x)$

b) $\lim_{x\to -2} \frac{x-2}{x+1} = \frac{-4}{-1} = 4$

Note: $(0,-2)$ is the y-int

c) $f(x)$ is continuous on $(-\infty,-2)\cup(-2,-1)\cup(-1,\infty)$

d) $f(x)$ has a vertical asymptote of $x=-1$.
$\lim_{x\to -1^-} \frac{x-2}{x+1} = \infty$ $\lim_{x\to -1^+} \frac{x-2}{x+1} = -\infty$

e) $\lim_{x\to\infty} f(x) = 1$ (Using Dominance) Horizontal Asymptote: $y=1$

Possible Graph:

7)

) $f(x) = \dfrac{2x^2 - 5x + 3}{x^2 + 6x - 7} = \dfrac{(2x-3)(x-1)}{(x+7)(x-1)}$

a) $f(x)$ has a removable discontinuity at $x = 1$.
$f(x)$ has an infinite discontinuity at $x = -7$

Note: $x = \frac{3}{2}$ is an x-int

b) $\lim\limits_{x \to 1} \dfrac{2x-3}{x+7} = -\dfrac{1}{8}$ (hole @ $(1, -1/8)$)

Note: $(0, -\frac{3}{7})$ is a y-int

c) $f(x)$ is continuous on $(-\infty, -7) \cup (-7, 1) \cup (1, \infty)$

d) The graph of $f(x)$ has a vertical asymptote of $x = -7$

$\lim\limits_{x \to -7^-} \dfrac{2x-3}{x+7} = \infty \qquad \lim\limits_{x \to -7^+} \dfrac{2x-3}{x+7} = -\infty$

e) $\lim\limits_{x \to \infty} f(x) = 2 \qquad \lim\limits_{x \to -\infty} f(x) = 2$

Horizontal asymptote : $y = 2$

Possible Graph

8)

$\lim\limits_{x \to -\infty} f(x) = -\infty \qquad f(1) = 3$

$\lim\limits_{x \to 1} f(x) = -2 \qquad \lim\limits_{x \to \infty} f(x) = 5$