For the following functions ...

- List any roots and the behavior of the graph at the roots.
- List all asymptotes, and the degree of all vertical asymptote.
- Find any points where the graph intersects a horizontal or oblique asymptote.
- Find the leading term and use it to determine the long term behavior.
- Label your axes

1. $f(x) = \dfrac{x^2+3x+2}{x-1}$
   Roots: $x=-2, x=-1$, both degree 1 (crosses)
   VA: $x=1$, degree 1
   OA: $y=x+4$, doesn't intersect
   Leading term: $x$, $f(x)\to\infty$ as $x\to\infty$, $f(x)\to-\infty$ as $x\to-\infty$.

2. $g(x) = \dfrac{3}{x^2-5x+6}$
   Roots: None
   VA: $x=2, x=3$, both degree 1
   HA: $y=0$, intersects at roots
   Leading term: $\frac{3}{x^2}$, $f(x)\to 0$ as $x\to\pm\infty$.

3. $f(x) = (x-3)(x+2)(x)^2$
   Roots: $x=3, x=-2$, both degree 1 (crosses), $x=0$, degree 2 (touches)
   VA: None
   OA/HA: None
   Leading term: $x^4$, $f(x)\to\infty$ as $x\to\pm\infty$.

4. $f(x) = \dfrac{x^2-16}{x}$
   Roots: $x=-4$ $x=4$, both degree 1 (cross)
   VA: $x=0$, degree 1
   OA: $y=x$, doesn't intersect
   Leading term: $x$, $f(x)\to\infty$ as $x\to\infty$, $f(x)\to-\infty$ as $x\to-\infty$.

5. $h(x) = (x+4)^3(x-1)^2$
   Roots: $x=-4$,degree 3 (cross), $x=1$, degree 2 (touches)
   VA: None
   OA/HA: None
   Leading term: $x^5$, $f(x)\to\infty$ as $x\to\infty$, $f(x)\to-\infty$ as $x\to-\infty$.

6. $g(x) = (x+2)(x)(2-x)$
   Roots: $x=-2, x=0, x=2$, all degree 1 (crosses)
   VA: None
   OA/HA: None
   Leading term: $-x^3$, $f(x)\to-\infty$ as $x\to\infty$, $f(x)\to\infty$ as $x\to-\infty$.

7. $f(x) = \dfrac{(x-1)(x+1)}{(x-3)(x+3)}$
   Roots: $x = 1, x = -1$, both degree 1 (crosses)
   VA: $x = 3, x = -3$, both degree 1
   HA: $y = 1$, doesn't intersect
   Leading term: 1, $f(x) \to 1$ as $x \to \pm\infty$

8. $q(x) = \dfrac{1}{x^2}$
   Roots: None
   VA: $x = 0$, degree 2
   HA: $y = 0$, doesn't intersect
   Leading term: $\frac{1}{x^2}$, $f(x) \to 0$ as $x \to \pm\infty$.