Open notes open book, no group work. Show work where appropriate. (#2 just need answers here)

#2) Classify each function as a power function, root function, polynomial function (state its degree), rational function, algebraic function, exponential function or logarithmic function.

a.) $f(x) = \dfrac{x-6}{x+6}$: rational function

b.) $g(x) = x + \dfrac{x^2}{\sqrt{x-1}}$: algebraic function

c.) $h(x) = 10^x$: exponential function, base $a = 10$

d.) $r(x) = x^{10}$: power function

e.) $s(t) = 2t^6 + t^4 - \pi$: polynomial degree 6.

f.) $k(\theta) = \cos(\theta) + \sin(\theta)$: trigonometric function

#6) What do all the members of the family of linear functions $f(x) = 1 + m(x+3)$ have in common? Sketch the graph for several members of the family.

Recall $Y = Y_0 + m(x - x_0)$ is   the   equation   of
a   line   with   slope   m   that   goes   through (x_0, y_0),
We   identify   that $Y = f(x) = 1 + m(x+3)$ is   a line
with   slope   m   through $(-3, 1)$. No   matter   which
m-value   we   choose   the   line   goes   through $(-3, 1)$.
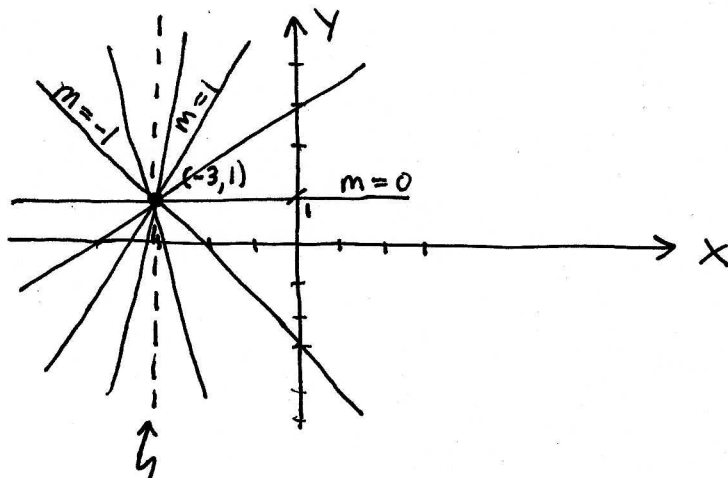
$X = -3$, we can't get that line through $(-3,1)$
but that is the only exception.

#9) Find an expression for a cubic function f if $f(1) = 6$ and $f(-1) = f(0) = f(2) = 0$.

It is a fact that if a zero is in the graph of a polynomial then there must be a corresponding factor in the factorized form of the polynomial.

This cubic polynomial has _three_ zeroes, $x = -1, 0, 2$ thus,

$$f(x) = A(x+1)x(x-2)$$

We also know $f(1) = 6$ thus,

$$f(x) = A(2)(1)(1-2) = -2A = 6 \therefore \underline{A = -3}$$

$$\boxed{f(x) = -3(x+1)x(x-2)}$$