1. Find all of the points $a$ such that the tangent line to $f(x) = \frac{x - 1}{x + 5}$ through $a$ passes through the point $(0, 5)$. Keep your answer in exact form and write down the ENTIRE command(s) you used to solve the problem, including inputs.

Solution: $a = -\frac{13}{2} - \frac{1}{2}\sqrt{39}$ and $a = -\frac{13}{2} + \frac{1}{2}\sqrt{39}$. The commands used were

```maple
define(f, x -> (x-1)/(x+5));
TL := (a, x) -> subs(t=a, diff(f(t),t)*(x-a)+f(a));
solve(TL(a,0)=5);
```

2. In Maple you can take higher order derivatives in one of two ways. First you can use several x’s following the function in the diff command. For example, to take the third derivative of $xe^x$ you could use `diff(x*exp(x),x,x,x);`. Another way is to replace the x’s by `x$n` where n is the derivative order. For example, to take the third derivative of $xe^x$ you could use `diff(x*exp(x),x$3);` and to take the 34"th derivative of $xe^x$ you could use `diff(x*exp(x),x$34);`. Use this to help you find a formula for the general $n$th derivative of

$$f(x) = \frac{1 - x}{x + 1}$$

Keep your answer in exact form and write down the ENTIRE command(s) you used to solve the problem, including inputs.

Solution:

$$f^{(n)}(x) = (-1)^n \left( \frac{n!}{(x+1)^n} + \frac{n!(1-x)}{(x+1)^{n+1}} \right)$$

The commands used were

```maple
diff((1-x)/(x+1),x);
diff((1-x)/(x+1),x^2);
diff((1-x)/(x+1),x^3);
diff((1-x)/(x+1),x^4);
diff((1-x)/(x+1),x^5);
diff((1-x)/(x+1),x^6);
```