33. $f(x) = \dfrac{x}{x+1}$

$$f(a) = \frac{a}{a+1}$$

$$f(a+h) = \frac{a+h}{a+h+1}$$

$$\frac{f(a+h) - f(a)}{h}$$

$$= \frac{\left(\dfrac{a+h}{a+h+1} - \dfrac{a}{a+1}\right)(a+h+1)(a+1)}{(h)(a+h+1)(a+1)}$$

$$\frac{(a+h)(a+1) - a(a+h+1)}{h(a+h+1)(a+1)}$$

$$= \frac{\cancel{a^2} + \cancel{ah} + \cancel{h} + \cancel{a} - \cancel{a^2} - \cancel{ah} - \cancel{a}}{\cancel{h}(a+h+1)(a+1)}$$

$$= \frac{1}{(a+h+1)(a+1)}$$

$a \neq -1, -1-h$

$h \neq 0$

35. $f(x) = 3 - 5x + 4x^2$

$f(a) = 3 - 5a + 4a^2$

$f(a+h) = 3 - 5(a+h) + 4(a+h)^2$

$$\frac{f(a+h) - f(a)}{h}$$

$$\frac{3 - 5(a+h) + 4(a+h)^2 - (3 - 5a + 4a^2)}{h}$$

$$\frac{\cancel{3} - \cancel{5a} - 5h + \cancel{4a^2} + 8ah + 4h^2 - \cancel{3} + \cancel{5a} - \cancel{4a^2}}{h}$$

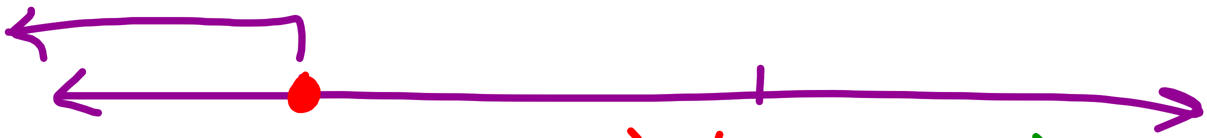
$$= \frac{-5\cancel{h} + 8a\cancel{h} + 4h^{\cancel{2}}}{\cancel{h}} = 4h + 8a - 5$$

$h \neq 0,$

19. (36%) Find all real values of x that satisfy $|x| + 3 - |x + 3| = 6$.

$\boxed{x \le -3}$

$x=0$ $\qquad$ $x=-3$



$-x+3-(x+3)=6$

$-2x=6$

$x=-3$

$x+3-(x+3)=6$

$0 \ne 6$

$-x+3-(-(x+3))=6$

$\cancel{-x}+3\cancel{+x}+3=6$

$6=6$

5. In the cube determined by $1 \le x \le 2$, $1 \le y \le 2$, $1 \le z \le 2$, determine the maximum numerical value of the function f defined by $f(x,y,z) = xyz - 3yz + 2x - 5$.

$$= yz(x-3) + 2x - 5 - 1 \quad + 1$$

$$= (x-3)(yz+2) + 1$$

$$\underbrace{(2-3)(1\cdot 1+2)}_{m}$$

$$(-1)(3)+1 = -2$$

$-2 \le x \le 7$

$-5 \le y \le 3$

$-\infty < \frac{x}{y} < \infty$

$-7 \le x + y \le 10$

$-5 = -2 - 3 \le x - y \le 7 - (-5) = 12$

$-35 \le xy \le 7 \cdot 3 = 21$