12. $y=f(x,c)=\text{pow\_constant}(x,c)=x^c$

12.3 $dx=dy\cdot cx^{c-1}$

13. $y=f(c,x)=\text{constant\_pow}(c,x)=c^x$

13.3 $dx=dy\cdot y\ln c$

14. $y=f(x)=\text{negate}(x)=-x$

14.3 $dx=-dy$

15 $y=f(x)=\exp(x)=e^x$

15.3 $dx=dy\cdot e^x=ydy$

16. $y=f(x)=\log(x)=\ln x$

16.3 $dx=\frac{dy}{x}$

17. $y=f(x)=\log1p(x)=\log(1+x)=\ln(x+1)$

17.3 $dx=dy\cdot\frac{1}{x+1}$

6. $y=f(x,c)=\text{add\_constant}(x,c)=x+c$

6.3 $dx=dy$

7. $y=f(x,c)=\text{sub\_constant}(x,c)=x-c$

7.3 $dx=dy$

8. $y=f(c,x)=\text{constant\_sub}(c,x)=c-x$

8.2 y=x.newSetSizeAs(x).fill(c).sub_onto(x)

8.3 $dx=-dy$

9. $y=f(x,k)=\text{mul\_constant}(x,k)=kx$

9.3 $dx=kdy$

10. $y=f(x,k)=\text{div\_constant}(x,k)=\frac{x}{k}$

10.3 $dx=\frac{dy}{k}$

11. $y=f(k,x)=\text{constant\_div}(k,x)=\frac{k}{x}$

11.2 y=x.newSetSizeAs(x).fill(k).div_(x)

11.3 $dx=-\frac{k}{x^2}dy$, here $dx:=\frac{dL}{dx}$

$dy:=\frac{dL}{dy}$

+-·÷

1. add: $z=f(x,y)=x+y$

1.3 $dz\Rightarrow dx,dy$, here $dz:=\frac{dL}{dz}$

$(dx,dy)=(dz,dz)$

2. $z=f(x,y)=\text{sub}(x,y)=x-y$

2.3 $(dx,dy)=(dz,-dz)$

3. $z=f(x,y)=\text{mul}(x,y)=xy$

3.3 $(dx,dy)=(ydz,xdz)$

4. $z=f(x,y)=\text{div}(x,y)=\frac{x}{y}$

4.3 $(dx,dy)=(\frac{dz}{y},-\frac{xdz}{y^2})$

$=(\frac{dz}{y},-\frac{zdz}{y})$

5. $y=f(x,p)=\text{pow}(x,p)=x^p$

5.3 $(dx,dp)=(dy\cdot px^{p-1},dy\cdot x^p\ln x)$

$=(dy\cdot p\frac{y}{x},dy\cdot y\ln x)$