```
> λ := λ;
  ϵ := ϵ;
  y := y;
  R := R;
  M := M;
```

$$\lambda := \lambda$$
$$\epsilon := \epsilon$$
$$y := y$$
$$R := R$$
$$M := M \tag{1}$$

```
> H := 15/8·1/M^3·λ·ϵ·(r/M)^2·(1-2·M/r)·(-M·(M-r)·(2·M^2+6·M·r-3·r^2)/(r^2·(2·M-r)^2)+3/2·
      ln(r/(r-2·M)))+M^2·ϵ·(r/M)^2·(1-2·M/r);
```

$$H := \frac{15}{8}\,\frac{\lambda\,\epsilon\,r^2\left(1-\frac{2M}{r}\right)\left(-\frac{M(M-r)\left(2M^2+6Mr-3r^2\right)}{r^2(2M-r)^2}+\frac{3}{2}\ln\left(\frac{r}{r-2M}\right)\right)}{M^5} + \epsilon\,r^2\left(1-\frac{2M}{r}\right) \tag{2}$$

```
> dH_dr := diff(H, r);
```

$$dH\_dr := \frac{15}{4}\,\frac{\lambda\,\epsilon\,r\left(1-\frac{2M}{r}\right)\left(-\frac{M(M-r)\left(2M^2+6Mr-3r^2\right)}{r^2(2M-r)^2}+\frac{3}{2}\ln\left(\frac{r}{r-2M}\right)\right)}{M^5} + \frac{15}{4}\,\frac{\lambda\,\epsilon\left(-\frac{M(M-r)\left(2M^2+6Mr-3r^2\right)}{r^2(2M-r)^2}+\frac{3}{2}\ln\left(\frac{r}{r-2M}\right)\right)}{M^4} + \frac{15}{8}\,\frac{1}{M^5}\left(\lambda\,\epsilon\,r^2\left(1-\frac{2M}{r}\right)\left(\frac{M\left(2M^2+6Mr-3r^2\right)}{r^2(2M-r)^2}-\frac{M(M-r)(6M-6r)}{r^2(2M-r)^2}\right.\right. + \frac{2M(M-r)\left(2M^2+6Mr-3r^2\right)}{r^3(2M-r)^2}-\frac{2M(M-r)\left(2M^2+6Mr-3r^2\right)}{r^2(2M-r)^3} + \left.\left.\frac{3}{2}\,\frac{\left(\frac{1}{r-2M}-\frac{r}{(r-2M)^2}\right)(r-2M)}{r}\right)\right) + 2\,\epsilon\,r\left(1-\frac{2M}{r}\right)+2\,\epsilon\,M \tag{3}$$

```
> H_R := subs(r=R, H);
```

$$H\_R := \frac{15}{8}\,\frac{\lambda\,\epsilon\,R^2\left(1-\frac{2M}{R}\right)\left(-\frac{M(M-R)\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^2}+\frac{3}{2}\ln\left(\frac{R}{R-2M}\right)\right)}{M^5} \tag{4}$$

$$+\epsilon R^2\left(1-\frac{2M}{R}\right)$$

> $dH\_dR := subs(r=R, dH\_dr);$

$dH\_dR :=$ **(5)**

$$\frac{15}{4}\,\frac{\lambda\epsilon R\left(1-\frac{2M}{R}\right)\left(-\frac{M(M-R)\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^2}+\frac{3}{2}\ln\left(\frac{R}{R-2M}\right)\right)}{M^5}$$

$$+\frac{15}{4}\,\frac{\lambda\epsilon\left(-\frac{M(M-R)\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^2}+\frac{3}{2}\ln\left(\frac{R}{R-2M}\right)\right)}{M^4}$$

$$+\frac{15}{8}\,\frac{1}{M^5}\left(\lambda\epsilon R^2\left(1-\frac{2M}{R}\right)\left(\frac{M\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^2}\right.\right.$$

$$-\frac{M(M-R)(6M-6R)}{R^2(2M-R)^2}+\frac{2M(M-R)\left(2M^2+6MR-3R^2\right)}{R^3(2M-R)^2}$$

$$-\frac{2M(M-R)\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^3}$$

$$\left.\left.+\frac{3}{2}\,\frac{\left(\frac{1}{R-2M}-\frac{R}{(R-2M)^2}\right)(R-2M)}{R}\right)\right)+2\epsilon R\left(1-\frac{2M}{R}\right)+2\epsilon M$$

> $eq := \frac{R\cdot dH\_dR}{H\_R} = y;$

$eq :=$ **(6)**

$$\left(R\left(\frac{15}{4}\,\frac{1}{M^5}\left(\lambda\epsilon R\left(1-\frac{2M}{R}\right)\left(-\frac{M(M-R)\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^2}\right.\right.\right.\right.$$

$$\left.\left.\left.\left.+\frac{3}{2}\ln\left(\frac{R}{R-2M}\right)\right)\right)\right)$$

$$+\frac{15}{4}\,\frac{\lambda\epsilon\left(-\frac{M(M-R)\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^2}+\frac{3}{2}\ln\left(\frac{R}{R-2M}\right)\right)}{M^4}$$

$$+\frac{15}{8}\,\frac{1}{M^5}\left(\lambda\epsilon R^2\left(1-\frac{2M}{R}\right)\left(\frac{M\left(2M^2+6MR-3R^2\right)}{R^2(2M-R)^2}\right.\right.$$

$$-\frac{M(M-R)(6M-6R)}{R^2(2M-R)^2}+\frac{2M(M-R)(2M^2+6MR-3R^2)}{R^3(2M-R)^2}$$

$$-\frac{2M(M-R)(2M^2+6MR-3R^2)}{R^2(2M-R)^3}$$

$$+\frac{3}{2}\frac{\left(\frac{1}{R-2M}-\frac{R}{(R-2M)^2}\right)(R-2M)}{R}\Bigg)\Bigg)+2\epsilon R\left(1-\frac{2M}{R}\right)+2\epsilon M\Bigg)\Bigg)$$

$$\Bigg/$$

$$\left(\frac{15}{8}\frac{\lambda\epsilon R^2\left(1-\frac{2M}{R}\right)\left(-\frac{M(M-R)(2M^2+6MR-3R^2)}{R^2(2M-R)^2}+\frac{3}{2}\ln\left(\frac{R}{R-2M}\right)\right)}{M^5}\right.$$

$$\left.+\epsilon R^2\left(1-\frac{2M}{R}\right)\right)=y$$

```
> solve( (6), lambda );
```

$$\frac{16}{15}\left(R^2M^5\left(8M^3y-12M^2Ry+6MR^2y-R^3y-8M^3+16M^2R-10MR^2+2R^3\right)\right)\Big/ \tag{7}$$

$$\left(-24M^3\ln\left(-\frac{R}{2M-R}\right)R^2y+36M^2\ln\left(-\frac{R}{2M-R}\right)R^3y-18M\ln\left(-\frac{R}{2M-R}\right)R^4y\right.$$

$$+3\ln\left(-\frac{R}{2M-R}\right)R^5y+8M^5y+12M^4Ry+24M^3\ln\left(-\frac{R}{2M-R}\right)R^2-44M^3R^2y$$

$$-48M^2\ln\left(-\frac{R}{2M-R}\right)R^3+30M^2R^3y+30M\ln\left(-\frac{R}{2M-R}\right)R^4-6MR^4y-6\ln\left(-\frac{R}{2M-R}\right)R^5+8M^5-8M^4R+52M^3R^2-48M^2R^3+12MR^4\Big)$$

```
> simplify( (7), 'size' );
```

$$\left(16R^2M^5(2M-R)^2(2My-Ry-2M+2R)\right)\Big/\left(-360\left(M-\frac{1}{2}R\right)^2\left((y-1)M\right.\right. \tag{8}$$

$$\left.-\frac{1}{2}R(y-2)\right)R^2\ln\left(-\frac{R}{2M-R}\right)+120M\left((y+1)M^4+R\left(\frac{3}{2}y-1\right)M^3\right.$$

$$\left.\left.-\frac{11}{2}\left(y-\frac{13}{11}\right)R^2M^2+\frac{15}{4}R^3\left(y-\frac{8}{5}\right)M-\frac{3}{4}R^4(y-2)\right)\right)$$

```
>
```