Benutzer:
#1: CaseMode := Sensitive

Datum: 15.02.2013

Zeit: 18:47:54

Benutzer:
#2: InputMode := Word

Benutzer:

$$\#3: \quad Sur(r, h) := 2\cdot\pi\cdot r^2 + \pi\cdot r\cdot\sqrt{r^2 + h^2}$$

Benutzer:

$$\#4: \quad Vol(r, h) := \frac{2}{3}\cdot\pi\cdot r^3 + \frac{1}{3}\cdot\pi\cdot r^2\cdot h$$

Benutzer:
#5: V :∈ Real (0, ∞)

Benutzer:
#6: r :∈ Real (0, (3·V/(2·π))^(1/3))

Benutzer=Simp(Benutzer):

$$\#7: \quad SOLVE(Vol(r, h) = V, h) = \left(h = \frac{3\cdot V - 2\cdot\pi\cdot r^3}{\pi\cdot r^2}\right)$$

Benutzer:

$$\#8: \quad S(r) := Sur\left(r, \frac{3\cdot V - 2\cdot\pi\cdot r^3}{\pi\cdot r^2}\right)$$

Benutzer=Simp(Benutzer):

$$\#9: \quad S(r) = \frac{\sqrt{9\cdot V^2 - 12\cdot\pi\cdot V\cdot r^3 + 5\cdot\pi^2\cdot r^6}}{r} + 2\cdot\pi\cdot r^2$$

Löse(Benutzer,r):

$$\#10: \quad SOLVE\left(\frac{d}{dr} S(r) = 0, r\right)$$

Simp(#10):

#11:

$$r = \frac{30000^{1/6}\cdot V^{1/3}\cdot\left(-\sqrt{\left(107 - 10\cdot\sqrt{61}\cdot\cos\left(\frac{\mathrm{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)} + \sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3} + \frac{\pi}{3}\right) + 107\right)} - \sqrt{\left(107 - 10\cdot\sqrt{61}\cdot\sin\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)} + 3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}} -$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)-\frac{\pi}{3}\right)+107}\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}\ v\ r =$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)-\frac{\pi}{3}\right)+107}\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}+$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)-\frac{\pi}{3}\right)+107}\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}\ v\ r = -$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)-\frac{\pi}{3}\right)+107}\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}-$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(-\sqrt{107-10\cdot\sqrt{61}\cdot COS\left(\frac{ACOT\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+\sqrt{10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)+107}+\sqrt{107-10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}}\lor r=-$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(-\sqrt{107-10\cdot\sqrt{61}\cdot COS\left(\frac{ACOT\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+\sqrt{10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)+107}+\sqrt{107-10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}}+$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(-\sqrt{107-10\cdot\sqrt{61}\cdot COS\left(\frac{ACOT\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+\sqrt{10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)+107}+\sqrt{107-10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}}\lor r=-$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(\sqrt{107-10\cdot\sqrt{61}\cdot COS\left(\frac{ACOT\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+\sqrt{10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)+107}-\sqrt{107-10\cdot\sqrt{61}\cdot SIN\left(\frac{ATAN\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}}-$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(\left(\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)\right)}\right)^4+107\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}\ \text{v r} = -$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(\left(\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)\right)}\right)^4+107\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}+$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(\left(\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)\right)}\right)^4+107\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}-3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}\ \text{v r} =$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(\left(\sqrt{\left(107-10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)\right)}\right)^4+107\right)+\sqrt{\left(107-10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+3\cdot\sqrt{3}\right)^{1/3}}{20^{1/3}\cdot\pi}-$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(\sqrt{107-10\cdot\sqrt{61}\cdot\mathrm{COS}\left(\frac{\mathrm{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+\sqrt{10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)+107}+\sqrt{107-10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}}\ \vee\ r =$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(\sqrt{107-10\cdot\sqrt{61}\cdot\mathrm{COS}\left(\frac{\mathrm{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+\sqrt{10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)+107}+\sqrt{107-10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}}\ +$$

$$\frac{30^{2/3}\cdot i\cdot V^{1/3}\cdot\left(\sqrt{107-10\cdot\sqrt{61}\cdot\mathrm{COS}\left(\frac{\mathrm{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+\sqrt{10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right)+107}+\sqrt{107-10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}+3\cdot\sqrt{3}\right)^{1/3}}{20\cdot\pi^{1/3}}\ \vee\ r = -$$

$$\frac{28125^{1/6}\cdot V^{1/3}\cdot\mathrm{COS}\left(\frac{\mathrm{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{10\cdot\pi^{1/3}}-\frac{15^{5/6}\cdot V^{1/3}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{10\cdot\pi^{1/3}}+$$

$$i\cdot\left(\frac{28125^{1/6}\cdot V^{1/3}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{10\cdot\pi^{1/3}}-\frac{15^{5/6}\cdot V^{1/3}\cdot\mathrm{COS}\left(\frac{\mathrm{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{10\cdot\pi^{1/3}}\right)\ \vee\ r = -$$

$$\frac{28125^{1/6}\cdot V^{1/3}\cdot\cos\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} - \frac{15^{5/6}\cdot V^{1/3}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} +$$

$$i\cdot\left(\frac{15^{5/6}\cdot V^{1/3}\cdot\cos\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} - \frac{28125^{1/6}\cdot V^{1/3}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}}\right) \vee r = -$$

$$\frac{28125^{1/6}\cdot V^{1/3}\cdot\cos\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} + \frac{15^{5/6}\cdot V^{1/3}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} -$$

$$i\cdot\left(\frac{15^{5/6}\cdot V^{1/3}\cdot\cos\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} + \frac{28125^{1/6}\cdot V^{1/3}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}}\right) \vee r = -$$

$$\frac{28125^{1/6}\cdot V^{1/3}\cdot\cos\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} + \frac{15^{5/6}\cdot V^{1/3}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} +$$

$$i\cdot\left(\frac{15^{5/6}\cdot V^{1/3}\cdot\cos\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}} + \frac{28125^{1/6}\cdot V^{1/3}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{1}{2}\right)}{3}\right)}{(10\cdot\pi)^{1/3}}\right) \vee r =$$

$$\frac{28125^{1/6}\cdot e^{-i\cdot\operatorname{ATAN}(1/2)/3}\cdot V^{1/3}}{(5\cdot\pi)^{1/3}} \vee r = \frac{28125^{1/6}\cdot e^{i\cdot\operatorname{ATAN}(1/2)/3}\cdot V^{1/3}}{(5\cdot\pi)^{1/3}} \vee r = -$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(-\sqrt{107 - 10\cdot\sqrt{61}\cdot\cos\left(\frac{\operatorname{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)}\right) + \sqrt{10\cdot\sqrt{61}\cdot\sin\left(\frac{\operatorname{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3} + \text{~}\right)}\text{~}}{(10\cdot\pi)^{1/3}}$$

$$\frac{\left(\frac{\pi}{3}+107\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+3\cdot\sqrt{3}\Bigg)^{1/3}}{} \vee r =$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\mathrm{COS}\left(\frac{\mathrm{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\right.\right.\right.}{10\cdot\pi^{1/3}}$$

$$\frac{\left(\frac{\pi}{3}+107\right)+\sqrt{\left(107-10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}-3\cdot\sqrt{3}\Bigg)^{1/3}}{} \vee r =$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(\left(-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\mathrm{COS}\left(\frac{\mathrm{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right.\right.\right.\right.}{10\cdot\pi^{1/3}}$$

$$\frac{\left.\left.\left.\left.\right)+107\right)-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}-3\cdot\sqrt{3}\Bigg)^{1/3}}{} \vee r = -$$

$$\frac{30000^{1/6}\cdot V^{1/3}\cdot\left(\left(-\sqrt{\left(107-10\cdot\sqrt{61}\cdot\mathrm{COS}\left(\frac{\mathrm{ACOT}\left(-\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+\sqrt{\left(10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}+\frac{\pi}{3}\right.\right.\right.\right.}{10\cdot\pi^{1/3}}$$

$$\frac{\left.\left.\left.\left.\right)+107\right)+\sqrt{\left(107-10\cdot\sqrt{61}\cdot\mathrm{SIN}\left(\frac{\mathrm{ATAN}\left(\frac{253\cdot\sqrt{503}}{9054}\right)}{3}\right)\right)}+3\cdot\sqrt{3}\Bigg)^{1/3}}{}$$

Approx(#11):
#12: r = 0.2440203969 − 0.4226557255·i ∨ r = 0.2440203969 + 0.4226557255·i ∨ r = −0.3367427487 − 0.5832555499·i ∨ r = −0.3367427487 + 0.5832555499·i ∨ r = 0.7440829484 − 0.1159218484·i ∨ r = 0.7440829484 + 0.1159218484·i ∨ r = −0.4226151129 − 0.7319908476·i ∨ r = −0.4226151129 + 0.7319908476·i ∨ r = −0.4724327398 − 0.5864338116·i ∨ r = −0.4724327398 + 0.5864338116·i ∨ r = 0.6234894693 − 1.079915438·i ∨ r = 0.6234894693 + 1.079915438·i ∨ r = −0.2716502086 − 0.7023556600·i ∨ r = −0.2716502086 + 0.7023556600·i ∨ r = −0.4880407938 ∨ r = 0.8452302259 ∨ r = 0.6734854975 ∨ r = −1.246978938