Optimization Test

1) $h(0) = 15.4 + 22.3(0) - 4.9(0)^2$

$\quad = 15.4\,m$

2) $h'(t) = 22.3 - 9.8t$

$\quad h'(0) = 22.3 - 9.8(0)$

$\quad\quad = 22.3\,m/s$

3) $h'(t) = 22.3 - 9.8t$

$\quad 0 = 22.3 - 9.8t$

$\quad 9.8t = 22.3$

$\quad t = \frac{223}{98}$

$\quad\quad \approx 2.28s$

4) $h\left(\frac{223}{98}\right) = 15.4 + 22.3\left(\frac{223}{98}\right) - 4.9\left(\frac{223}{98}\right)^2$

$\quad\quad \approx 40.78\,m$

5) $R(q) = q \cdot p(q)$

$\quad\quad = q(3q + 6000)$

$\quad\quad = -3q^2 + 6000q$

$\quad R'(q) = -6q + 6000$

$\quad 0 = -6q + 6000$

$\quad 6q = 6000$

$\quad q = 1000$

$R(1000) = -3(1000)^2 + 6000(1000)$

$\quad\quad = 3000000$

6) $P(q) = R(q) - C(q)$

$\quad = (-3q^2 + 6000q) - (17q^2 - 40q + 3000)$

$\quad = -3q^2 + 6000q - 17q^2 + 40q - 3000$

$\quad = -20q^2 + 6040q - 3000$

6 cnt'd) $P'(q) = -40q + 6040$

$\quad 0 = -40q + 6040$

$\quad 40q = 6040$

$\quad q = 151$

$P(151) = -20(151)^2 + 6040(151) - 3000$

$\quad\quad = 453020$

7) $SA = \pi r^2 + (320 \div \pi r^2)$

$\quad SA' = 2\pi r - 640 \div \pi r^3$

$\quad 0 = 2\pi r - 640 \div \pi r^3$

$\quad r = \frac{2\sqrt[4]{20\pi^2}}{\pi} \approx 4.23\,cm$

$\quad 320 = \pi r^2 \cdot h$

$\quad\quad = \pi \left(\frac{2\sqrt[4]{20\pi^2}}{\pi}\right) \cdot h$

$\quad 320 = 8\sqrt{5} \cdot h$

$\quad h = 8\sqrt{5} \approx 17.89\,cm$