1. (a) $f'(x) = \dfrac{\sqrt{1+e^{x^2}}\sec^2(x) - \tan(x)\left(\frac{1}{2\sqrt{1+e^{x^2}}}\right)(2x)e^{x^2}}{1+e^{x^2}}$

   (b) $y' = (\tan x)^{x^2} \cdot (x+1)^{2/3}\left(x^2\dfrac{\sec^2(x)}{\tan(x)} + 2x\ln(\tan(x)) + \dfrac{2}{3(x+1)}\right)$

   (c) (i) $g'(t) = \dfrac{4}{1+\frac{t}{\ln t}} \cdot \dfrac{\ln t - 1}{(\ln t)^2}$

2. (a) $4e^4$ (b) $-\frac{1}{2}$ (c) $\dfrac{15}{2}$

3. (a) $y - 1 = -\dfrac{16}{7}(x-2)$ (b) 1.183 (c) $y'' = -\dfrac{1326}{343}$ so over-estimate

4. 61.3 mph

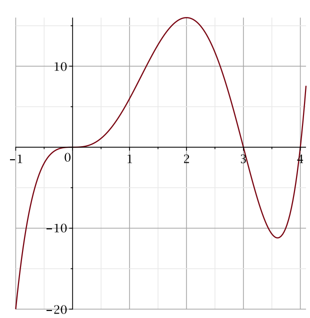
5. $r = \sqrt[3]{\dfrac{3000}{4\pi}}$ and $h = \dfrac{1500}{\pi} \cdot \left(\dfrac{4\pi}{3000}\right)^{\frac{2}{3}}$

6. (a) y-intercept $y = 0$
   x-intercepts $x = 0, 3, 4$

   (b) $x = 2$ gives a local maximum, $x = 3.6$ gives a local minimum and $x = 0$ is neither.

   (c) Inflection points are $(0,0)$, $(1.2, 8.7)$ and $(3,0)$. Concave down if $x < 0$ or $1.2 < x < 3$.

   (e) Local minimum at about $(3.6, -11.2)$.
   Local maximum at $(2, 16)$.



7. (a) $c = 4$ and $d = 1$. (b) $g'(x)$ is continuous at $x = 1$.
   Note: to get full credit you must use left and right limits, and the definition of the derivative.