① 76.8 mph

② ∞

③ $y(\pi/8) = \frac{1}{4}$ ft

$y'(\pi/8) = 4$ ft/sec

④ $(-3, 4)$ and $(3, -4)$

⑤ a) $\frac{dV}{dt} = 20\pi r^2$ in^3/min

i) $\frac{dV}{dt} = 2000\pi$ in^3/min

ii) $\frac{dV}{dt} = 4500\pi$ in^3/min

b) Volume is a cubic measure.

⑥ $\frac{dh}{dt} = \frac{5}{36\pi}$ ft/min ≈ 0.0442 ft/min

⑦ $\frac{d\theta}{dt} = \frac{1}{200}$ rad/sec

⑧ Absolute minimum at $(0, 1)$

Absolute maximum at $(\frac{\pi}{3}, 2)$

⑨ a) $f'(x) = \frac{1-x^2}{(x^2+1)^2}$

b) $f''(x) = \frac{2x(x^2-6)}{(x^2+1)^3}$

c) relative min. at $(-1, -\frac{1}{2})$

relative max at $(1, \frac{1}{2})$

⑩ 33 mph

⑪ $(8.2 \times 8.2 \times 8.1)$ cm

approximately

⑫ (9×9) in.

⑬ a) $dV \approx \pm 11.76$ in^3

b) $dSA \approx \pm 3.36$ in^2

⑭ a) 4.27%

b) 1.5%

⑮ $x \approx 2.3$ minutes

⑯ Skip (Calc. II)

⑰ Skip (Calc. II)

⑱ a) $\frac{128}{15}$ sq. units

b) $\frac{10}{3}$ sq. units

⑲ $\frac{27}{4}$ sq. units

d) POI: $\left(-\sqrt{6}, -\frac{\sqrt{6}}{7}\right)$, $(0, 0)$, $\left(\sqrt{6}, \frac{\sqrt{6}}{7}\right)$

e) $(-1, 1)$

f) $(-\infty, -1) \cup (1, \infty)$

g) Concave upward on

$(-\sqrt{6}, 0) \cup (\sqrt{6}, \infty)$

concave downward on

$(-\infty, -\sqrt{6}) \cup (0, \sqrt{6})$