

AP CALCULUS PROBLEM SET #6 RATES ANSWER KEY

1. a)  $\frac{dP}{dt} = \frac{24}{\pi}$  in/sec

b)  $\frac{dA}{dt} = \frac{120}{\pi} - 30$  in<sup>2</sup>/sec

2. a) 15 ft<sup>3</sup>

b)  $\frac{dh}{dt} = -\frac{2}{5}$  ft/min when  $h = \frac{3}{2}$  ft

c)  $\frac{dA}{dt} = -\frac{4}{3}$  ft<sup>2</sup>/min when  $V = \frac{15}{4}$  ft<sup>3</sup>

3. a)  $\frac{20}{7}$  ft/sec

b) 35 ft from A

c)  $\frac{35}{8}$  ft/sec

4. a)  $V = \frac{\pi h^3}{27}$  ft<sup>3</sup>

b)  $\frac{dV}{dt} = -9\pi$  ft<sup>3</sup>/sec

c)  $\frac{dy}{dt} = \frac{9}{400}$  ft/sec

5. a)  $\frac{\pi}{4} < \theta < 1.373$

b)  $P(x, y) = P(\tan \theta, \tan^2 \theta)$

c)  $20\sqrt{37} \pi$

6. a)  $k = \frac{9}{2}$

b)  $k = \frac{3}{2}w$

c)  $\left. \frac{dk}{dt} \right|_{w=5} = \frac{21}{2}$

d)  $\left. \frac{dA}{dt} \right|_{w=5} = -0.07 \therefore$  area is decreasing