

AP Calculus Chapter 3 Test – Review 2

1. Water is flowing out of an inverted cone at a rate of $40 \text{ cm}^3/\text{sec}$. The height of the cone is 24 cm and the diameter is 12 cm.

a) Find the rate of change in the height of the cone when the radius is 2 cm.

b) Find the rate of change in the radius of the cone when the radius is 2 cm.

2. a) Implicitly differentiate: $x^3 + 2y^3 = 3xy^2$

b) Find the slope of the tangent line(s) of the curve at $x = 2$.

3. Suppose the motion of a particle is given by $s(t) = 2t^3 - 4t^2 - 6t + 1$

a) find the velocity function

b) find the acceleration function

c) When is the particle moving to the left? Right?

d) When does the particle change direction?

e) When is the particle slowing down? Speeding up?

f) Sketch the motion of the particle.

4. Suppose $f(x) = [3g(x)]^5$, find $f'(x)$ in terms of $g'(x)$

5. Suppose $f(x) = \begin{cases} 2ax^2 + bx & \text{when } x > 2 \\ 3ax^3 + 5bx + 2 & \text{when } x \leq 2 \end{cases}$
and $f(x)$ is continuous and differentiable. Find a and b .

6. The radius of a circle is measured with an error of .15%. Estimate the percent error in the area calculation.

7. Two cars leave the same point at the same time. One heads north at 60 km/h and the other east at 70 km/h. After 2 hours, how fast is the distance between the cars increasing?