

AP Calc – Chapter 3 Additional Practice Problems

1. A 20 ft ladder slides down a wall at 5 ft/sec. At what speed is the bottom sliding out when the top is 10 ft from the floor (in ft/sec)?
2. Find a positive value c , for x , that satisfies the conclusion of the Mean Value Theorem for Derivatives for $f(x) = 3x^2 - 5x + 1$ on the interval $[2, 5]$.
3. Find dy/dx if $x^3y + xy^3 = -10$
4. Find the equation of the tangent line to $9x^2 + 16y^2 = 52$ through $(2, -1)$
5. A particle's position is given by $s = t^3 - 6t^2 + 9t$. a) Find the velocity of the particle b) Find the acceleration at $t = 4$ c) When is the particle moving to the right (forward)? To the left (backward)? d) When does the particle change direction? e) When is the particle speeding up? Slowing down? f) Graph the motion of the particle.
6. If $f(x) = \sin^2x$, find $f''(x)$
7. Find the slope of the normal line to $y = x + \cos xy$ at $(0, 1)$
8. If $y = \left(\frac{x^3 - 2}{2x^5 - 1}\right)^4$, find dy/dx at $x = 1$
9. Find the value(s) of dy/dx of $x^2y + y^2 = 5$ at $y = 1$.
10. If $f(x)$ is continuous and differentiable and $f(x) = \begin{cases} ax^4 + 5x; & x \leq 2 \\ bx^2 - 3x; & x > 2 \end{cases}$, then $b =$
11. a) Know derivatives of all the trig functions b) review your unit circle c) review error analysis problems... such as if side has a $\pm 1\%$ error, what will volume have error of...

Answers:

1. 2.887 ft/s
2. $7/2$
3. $-(3x^2y + y^3)/(3xy^2 + x^3)$
4. $9x - 8y = 26$
5. a) $v = 3t^2 - 12t + 9$ b) $a = 6t - 12$, so at $t = 4$, $a = 12$ c) Forward $0 < t < 1$ and $t > 3$, backward $1 < t < 3$ d) at $t = 1$ and $t = 3$ e) speeding up $1 < t < 2$ and $t > 3$, slowing down $0 < t < 1$ and $2 < t < 3$ f) see your notes!
6. $-4\sin 2x$
7. -1
8. -52
9. $\pm 2/3$
10. 6