

Math 31, Quiz 3 Repeat. Name (first, last):

If you scored a D or an F grade on quiz 3, or didn't take it, then you can do these eight questions to get your quiz 3 grade up to a C. The questions are worth 5 points each. To get all 5 points it is very important that you show clearly all your working out and reasoning.

If you need help with these questions, homework questions or in understanding any topics in the course:

- My office hours are Monday, Wednesday 4-5 in CP 317.
 - Our dedicated SI leader Israt can help you in Sage Hall, 2nd floor, Computer Lab A on Monday, Wednesday 12:15 - 1:30.
 - The tutoring lab is open from 10 am in CP 303.
-

Q1. Use implicit differentiation to find $\frac{dy}{dx}$ if $\tan(y) = x^2y - 20$

Q2. Find the equation of the tangent line to the curve $x^2 + 3xy - y^2 = 3$ at the point $(1, 2)$.

Q3. A baseball is batted vertically upwards and its height after t seconds is

$$s(t) = 36t - 6t^2 \quad \text{meters.}$$

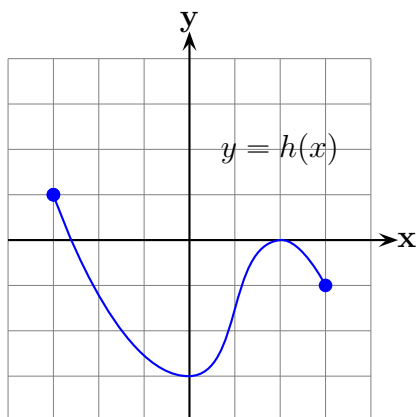
- (a)** Find $v(t)$, the velocity of the ball at time t .
- (b)** Find $a(t)$, the acceleration of the ball at time t .
- (c)** When does the ball reach its maximum height?
- (d)** What is this maximum height?

Q4. Suppose $x^3 + y^4 = 9$. If $\frac{dx}{dt} = 3$ then find $\frac{dy}{dt}$ when $x = 2$ and $y = 1$.

Q5. A snowball melts so that its surface area decreases at a rate of $3 \text{ cm}^2/\text{min}$. Find the rate at which its radius decreases when the radius is 6 cm . Give your answer in the correct units. (A sphere of radius r has surface area $4\pi r^2$.)

Q6. Use a linear approximation to estimate the cube root: $\sqrt[3]{8.06}$

Q7.



This is the graph of the function $h(x)$ on the closed interval $[-3, 3]$. Find the absolute maximum and minimum values of h on this interval. Also give the coordinates of any local maximums and minimums.

Q8. Find the absolute maximum and minimum values of $g(x) = x^3 - 12x + 3$ on the closed interval $[-3, 3]$.