

Week 9 FRQ

1) Let f be the function defined by $f(x) = \sin^2 x - \sin x$ for $0 \leq x \leq \frac{3\pi}{2}$.

a) Find the x -intercepts of the graph of f .

b) Find the intervals on which f is increasing.

c) Find the absolute maximum and absolute minimum value of f .

2) For $x^2 + 2x + y^4 + 4y = 5 \dots$

a) Write an equation for the line tangent to the curve at the point $(-2, 1)$.

b) Find the coordinates of the two points on the curve where the line tangent to the curve is vertical.

c) Is it possible for this curve to have a horizontal tangent at points where it intersects the x-axis? Explain why or why not.

3) Brewing Rate of Coffee

t (min)	0	1	2	3	4	5	6
$C(t)$ ounces	0	5	8.3	10.5	12	13	13.6

a) Use the data in the table to approximate $C'(5.5)$.

c) The amount of coffee is modeled by $B(t) = t^3 + 4t^2$. Find the rate at which the amount of coffee is changing at $t=4$.

b) Is there a time t , $1 \leq t \leq 5$, at which $C'(t) = 2$? Explain fully using the Mean Value Theorem.