## AP Calculus Semester 1 Final – Additional Review

No Calculator Allowed

1. The figure shows the graph of f', the derivative of the function f, on the closed interval $-9 \leq x \leq 9$. The graph of f' has tangent lines at x = -6, x = 2.5, and x = 6. The function f is twice differentiable with f(-3) = -1

a) For what values of x is the graph of f increasing? Decreasing?

GRAPH OF $f'(x)$

b) For what values of x is the graph of f concave up? Concave down?
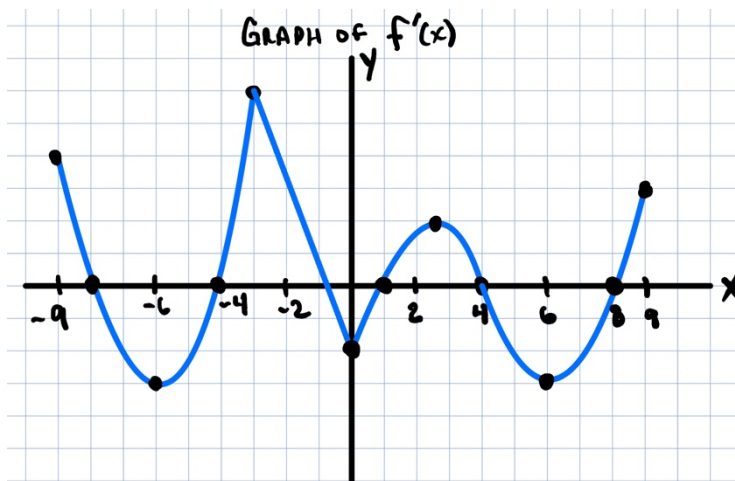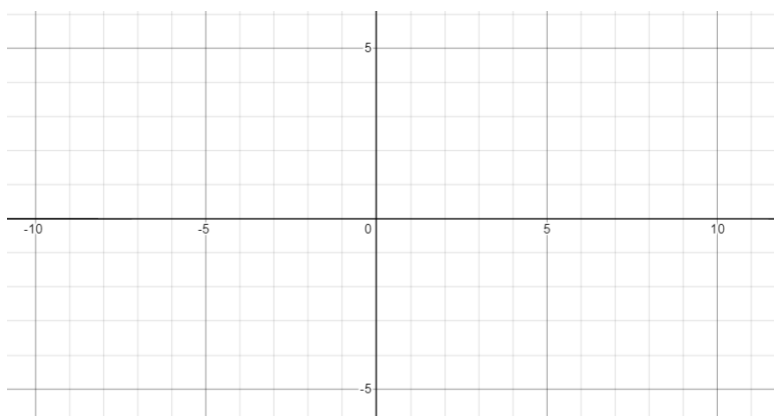
c) Find the x-coordinate of each local maximum and minimum of f. Justify your answer.

d) Find the x-coordinate of each point of inflection for f. Justify your answer.

e) On what intervals is the graph of f concave up and has a negative slope? Explain your reasoning.

f) For the interval $-9 \leq x \leq 9$, sketch a possible graph of f on the axes provided.

2. Suppose you had the curve for $x^3 - 3x^2y + 2xy^2 = 12$

a) Find $\dfrac{dy}{dx}$

b) Find $\dfrac{dy}{dx}$ at the point (-1, 3).

c) Find the equation of the tangent line at the point (2, -1)

d) Find $\dfrac{d^2y}{dx^2}$

Calculator Allowed
The position of a particle moving in a straight line is given by the equation
$f(t) = t^3 - 4\sin\left(\frac{\pi t}{2}\right) - 3t$. Where t is in seconds.

a) Find the average velocity of the particle over the interval $0 \le t \le 4$.

b) Determine the intervals when the particle is moving the left or to the right.

c) Determine the intervals when the particle is speeding up or slowing down.