

YOUR NAME: _____

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Find the domain of the rational function

$$f(x) = \frac{3x + 7}{x^3 - 7x^2 - 18x}.$$

2. If a store sells x items per week, then its weekly cost is $C(x) = 40x + 3000$ and its weekly revenue is $R(x) = -2x^2 + 200x$.

- (a) Find the store's break even point(s).

- (b) Find the number of items that should be sold weekly to maximize profit.

3. Consider the quadratic function

$$f(x) = -x^2 + 2x + 3.$$

(a) Locate its vertex.

(b) Find its opening direction.

(c) Find the y -intercept.

(d) Find the x -intercept(s).

(e) Sketch the graph of $y = f(x)$, **clearly labeling** all points of interest collected in (a)-(d).