

Quiz #3

Problem 1: Graph the following parabola by determining whether the graph opens up or down and by finding its vertex, axis of symmetry, x and y intercepts, if any. Determine the domain and range of the function. Determine where the function is increasing and where it is decreasing:

$$p(x) = -3x^2 + 3x + 2$$

Problem 2: The price p and the quantity x sold of a certain product obey the demand equation

$$p = -\frac{1}{6}x + 100, \quad 0 \leq x \leq 600.$$

- Express the revenue R as a function of x .
- What is the revenue if 200 units are sold?
- What quantity x maximizes the revenue? What is the maximum revenue?
- What price should the company charge to maximize the revenue?

Problem 3: Use transformations of the graph $y = x^4$ to graph

$$q(x) = (x + 1)^4 + 1.$$

Problem 4: For the polynomial function

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

find the following

- x and y intercepts,
- Determine whether the graph crosses or touches the x -axis at each x -intercept,
- Find the power of function that the graph of f resembles for large values of x and $-x$,
- Find where $f(x) > 0$ and where $f(x) < 0$.
- Plot the graph of $f(x)$.

Problem 5: Graph the following rational function, determine the asymptotes, intercepts and intervals where $f(x) > 0$:

$$r(x) = -\frac{1}{x^2 - 2x + 1}.$$

Problem 6: Solve the following inequality:

$$\frac{(x - 3)(x + 2)}{(x - 1)} \leq 0.$$

Problem 7: Confirm that $x - 2$ is factor of $h(x) = 3x^4 - 6x^3 - 5x + 10$. Using the rule of signs, determine the number of real zeros. Find all possible rational zeroes of this polynomial.

Problem 8: Solve the equation in real number system:

$$2x^3 + 5x^2 - 14x - 8 = 0.$$

Problem 9: Let $f(x) = x^2 + x + 1$, $g(x) = x + 3$ and $h(x) = -2$. Find $f \circ g$ and $f \circ h$.

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