Worksheet 04 - Finding Zeros of Polynomial Functions

Section 04: Polynomial Functions

Problem 1: Finding Zeros Using the Quadratic Formula (x)

For each function below:

1. Find all zeros (roots) of the function
2. Use your calculator's table function to create a value table in the "interesting" range
3. Sketch the graph of the function

a) $f(x) = 2x^2 + 2x - 12$
b) $f(x) = 3x^2 - 13.5x + 6$
c) $f(x) = -2x^2 - 2x + 4$
d) $f(x) = 0.5x^2 - 2x - 10.5$

Problem 2: Finding Zeros by Factoring (xx)

For each function below:

1. Find all zeros by factoring out common terms
2. Use your calculator's table function to create a value table in the "interesting" range
3. Sketch the graph of the function

a) $f(x) = 3x^3 - 12x$
b) $f(x) = -x^3 - 2x^2$ c)b$f(x) = 3x^3 + 2x^2 - 8x$
c) $f(x) = -3x^4 + 6x^3$
d) $f(x) = 3x^5 - 12x^3$

Problem 3: Finding Zeros by Substitution (xxx)

For each function below:

1. Use substitution ($u = x^2$) to find all zeros
2. Use your calculator's table function to create a value table in the "interesting" range
3. Sketch the graph of the function

> Tip
>
> Remember that after solving for u, you need to solve $x^2 = u$ for each positive value of u (negative values of u have no real solutions since x^2 cannot be negative).

a) $f(x) = 0.5x^4 - 3x^2 + 4$
b) $f(x) = 0.2x^4 + 0.8x^2 - 9$

Problem 4: Mixed Practice (xx)

Choose the appropriate method (quadratic formula, factoring, or substitution) to find all zeros of each function:

a) $f(x) = x^2 + 7x + 12$
b) $f(x) = 2x^3 - 8x$
c) $f(x) = x^4 - 5x^2 + 4$
d) $f(x) = -4x^2 + 12x - 9$

Problem 5: Application - Projectile Motion (xxx)

A ball is thrown upward from a platform. Its height h (in meters) above the ground after t seconds is given by:

$$h(t) = -5t^2 + 20t + 15$$

a) At what time(s) is the ball at ground level (height = 0)? Show your work using the quadratic formula.
b) What is the maximum height reached by the ball? (Hint: This occurs at the vertex of the parabola, at $t = -\frac{b}{2a}$)
c) At what time does the ball reach its maximum height?
d) For how long is the ball above 30 meters? (Solve $h(t) = 30$)