# Magnet Precalculus C
# Semester Exam Review

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# Contents

Chapter 1 Page 2

1.1 Solving polynomials 2
1.2 Domain and range of functions 2
1.3 Increasing, decreasing, and constant intervals 3

# Chapter 1

## 1.1 Solving polynomials

**Question 1**

Solve for $x$ where $2x^3 = -3x^2 + 2x$

***Solution:*** Subtract $-3x^2 + 2x$ from both sides to find that $2x^3 + 3x^2 - 2x = 0$. Factor $x$ from that identity to find that $x(2x^2 + 3x - 2) = 0$. Multiplying 2 by -2 tells us that we need to find two numbers which sum to 3 and produce -4. These numbers are -1 and 4. $2x + 4$ can be simplified to $x + 2$. We now know that the factors of $2x^2 + 3x - 2$ are $x + 2$ and $2x - 1$. Therefore, $x(2x^2 + 3x - 2) = x(x + 2)(2x - 1)$. The values of $x$ are 0, -2, and $\frac{1}{2}$.

**Question 2**

Solve for $x$ where $x^2 = 3x - 1$

***Solution:*** Subtract $3x - 1$ from both sides to find that $x^2 - 3x + 1 = 0$. There are no two numbers which sum to -3 and produce 1, so we must use the quadratic formula. $x = \frac{3 \pm \sqrt{9-4(1*1)}}{2} = \boxed{\frac{3 \pm \sqrt{5}}{2}}$.
*Solution*

## 1.2 Domain and range of functions

**Question 3**

Find the domain and range of the function $f(x) = x^2 + sqrtx - 3$

***Solution:*** The more restrictive function is the square root function, so we must look there to find our domain restriction. We can see that the square root is translated 3 units to the right, so the domain is $[3, \infty)$. At $x = 3$, $y = 3^2 + sqrt3 - 3 = 3^2 = 9$, so the point at which the curve ends is $(3, 9)$. The range is $[9, \infty)$

**Question 4**

Find the domain and range of the function $f(x) = \frac{x-5}{x^2-x-20}$

***Solution:*** $x^2 - x - 20$ can be factored into $(x + 4)(x - 5)$, and since $x - 5$ is in the numerator and denominator, it can be removed. We are left with $f(x) = \frac{1}{x+4}$. This is a reciprocal function, translated 4 units left. This means that its domain is $\mathbb{R}; x \neq -4$, and its range is $\mathbb{R}; y \neq 0$, since its asymptotes are at $y = 0$ and $x = -4$.

## 1.3 Increasing, decreasing, and constant intervals

**Question 5**

Determine the intervals over which the function $f(x) = (x^2 - 4)^2$ is increasing, decreasing, or constant