

## Quiz #9

Monday, December 11 2017

**Duration: 20 min**

**NAME:** \_\_\_\_\_

**Please write clearly and properly. Justify your answers carefully.**

<b>Problem</b>	<b>Grade</b>
<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>Total</b>	

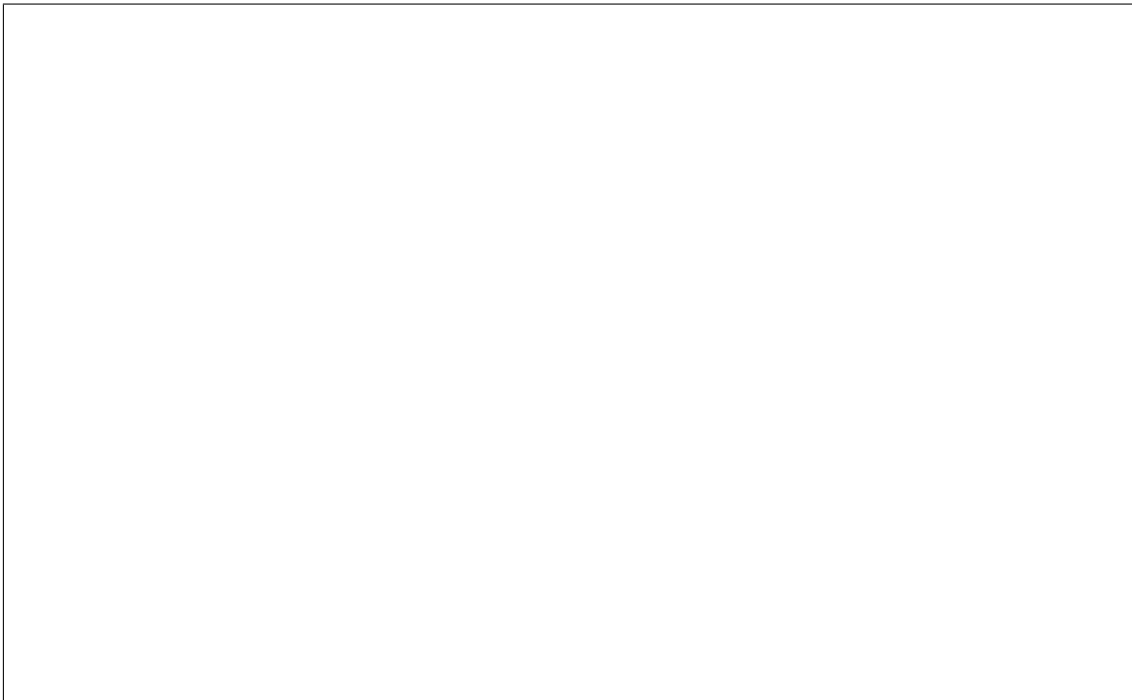
**Problem 1** (~ 4 points).

Consider the polynomials  $A \in \mathbb{Q}[x]$  and  $B \in \mathbb{Q}[x]$  defined by:

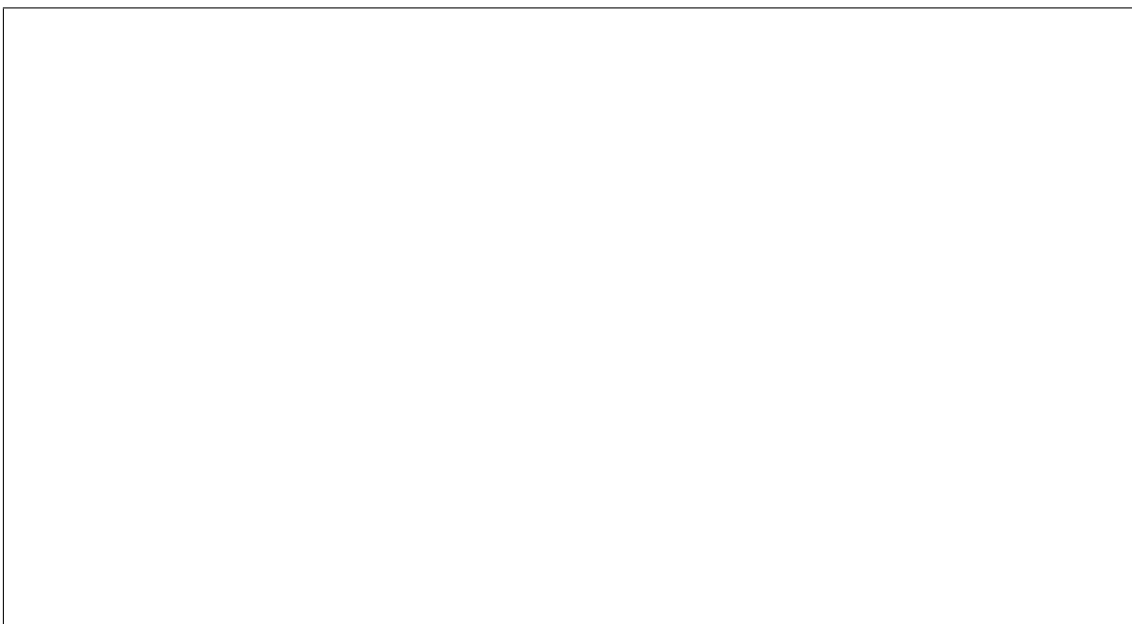
$$A = x^3 - 2x^2 + x + 2$$

$$B = x + 2$$

(1) Compute the Euclidean division of  $A$  by  $B$ .



(2) Derive the value of  $A(-2)$  from the previous question. Check your answer with a direct calculation of  $A(-2)$ .



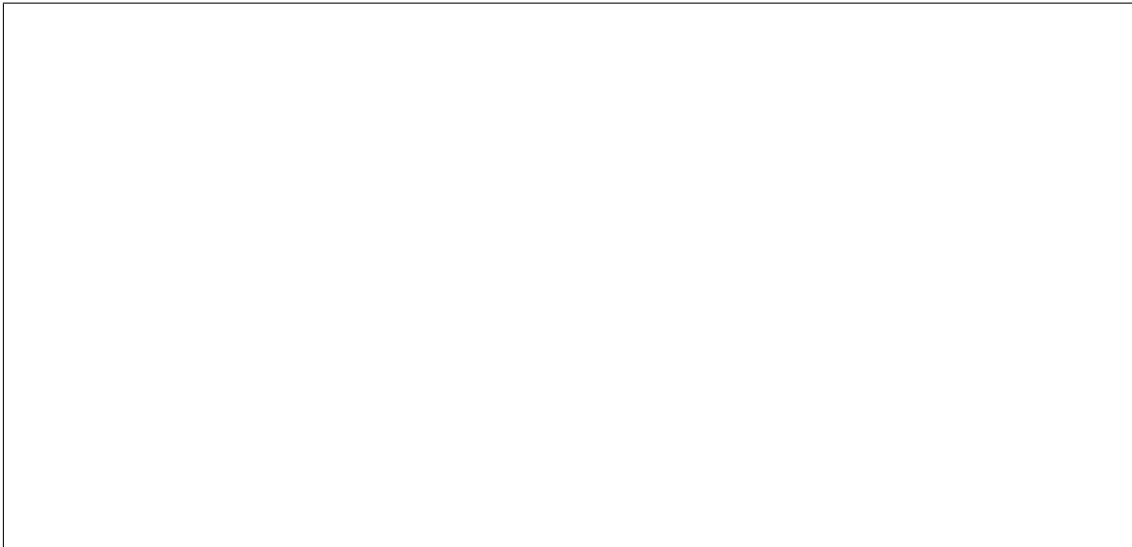
**Problem 2** (~ 4 points).

Consider the polynomial  $P \in \mathbb{R}[x]$  defined by  $P = x^3 - x^2 - 8x + 12$ .

- (1) Find a root  $\alpha \in \mathbb{R}$  of the polynomial  $P$ . *Hint: try small integers.*

- (2) Write  $P$  as a product of polynomials of degree 1. *Hint: start by finding the quotient of  $P$  by  $x - \alpha$ , where  $\alpha$  is the root you found in the previous question.*

(3) What are the roots of  $P$ ? Explain.



**Problem 3** (~ 2 points).

Consider the ring  $R = \mathbb{Z}/3\mathbb{Z}$  and the polynomial  $P \in \mathbb{R}[x]$  defined by  $P = x^5 + 2x$ . What are the roots of  $P$ ? Is  $P$  the zero polynomial?

