College Review Math
Section 2A & 2B

Name KEY

Determine if the following are polynomial functions (yes or no). Then find the zeros (roots), if they exist, for all the functions given

	YES/NO	ZEROS (ROOTS)
1) $f(x) = x^3 - 2x^2 - 48x$	yes	-6, 0, 8
2) $g(x) = \frac{x^2 - 1}{3}$	yes	± 1
3) $h(x) = 3x^{-2} + 1$	no	$\pm i\sqrt{3}$
4) $k(x) = \frac{2}{3}x - 14$	yes	21
5) $f(x) = \frac{x^2 + 7x + 6}{x^2 - 1}$	no	-6
6) $g(x) = -11$	yes	none

1) $x^3 - 2x^2 - 48x = 0$
$x(x^2 - 2x - 48) = 0$
$x(x - 8)(x + 6) = 0$
$x = 0, x = 8, x = -6$

2) $(3)\frac{x^2 - 1}{3} = 0(3)$
$x^2 - 1 = 0$
$(x - 1)(x + 1) = 0$
$x = 1, x = -1$

3) $3x^{-2} + 1 = 0$
$\frac{3}{x^2} + 1 = 0$
$3 + x^2 = 0$
$x^2 = -3$
$x = \pm i\sqrt{3}$

4) $\frac{2}{3}x - 14 = 0$
$\frac{2}{3}x = 14$
$\left(\frac{3}{2}\right)\frac{2}{3}x = 14\left(\frac{3}{2}\right)$
$x = 21$

5) $(x^2 - 1)\frac{x^2 + 7x + 6}{x^2 - 1} = 0(x^2 - 1)$
$x^2 + 7x + 6 = 0$
$(x + 1)(x + 6) = 0$
$x = -1, x = -6$, but $x \neq -1$

6) $-11 = 0$
False statement, therefore no zeros.

Use the functions $f(x) = 3x^2 - x + 15$ to find the following values.

7) $f(-6) =$ ____________

$f(-6) = 3(-6)^2 - (-6) + 15$
$= 3(36) + 6 + 15$
$= 108 + 6 + 15$
$= 129$

8) $f(-2i) =$ ______________

$f(-2i) = 3(-2i)^2 - (-2i) + 15$
$= 3(4i^2) + 2i + 15$
$= 3(-4) + 2i + 15$
$= -12 + 2i + 15 = 3 + 2i$

Use the functions $g(x) = x^2(x - 5) - 2$ to find the following values.

9) $g(-2\sqrt{3}) =$ ______________

$g(-2\sqrt{3}) = (-2\sqrt{3})^2(-2\sqrt{3} - 5) - 2$
$= (4\sqrt{9})(-2\sqrt{3} - 5) - 2$
$= 12(-2\sqrt{3} - 5) - 2$
$= -24\sqrt{3} - 60 - 2$
$= -24\sqrt{3} - 62$

10) $g(2i + 1) = (2i + 1)^2(2i + 1 - 5) - 2$
$= (2i + 1)(2i + 1)(2i - 4) - 2$
$= (4i^2 + 2i + 2i + 1)(2i - 4) - 2$
$= (-4 + 4i + 1)(2i - 4) - 2$
$= (-3 + 4i)(2i - 4) - 2$
$= -6i + 12 + 8i^2 - 16i - 2$
$= 10 - 22i - 8$
$= 2 - 22i$

Use synthetic substitution to find the following values.

$f(x) = x^3 - 3x^2 - 8x + 21$

$g(x) = 4x^4 + x^2 - 7x - 11$

11) f(-2) = 17

12) f(5) = 31

13) g(-1) = 1

14) g(1/2) = -14

-2	1	-3	-8	21
		-2	10	-4
	1	-5	2	17

5	1	-3	-8	21
		5	10	10
	1	2	2	31

-1	4	0	1	-7	-11
		-4	4	-5	12
	4	-4	5	-12	1

1/2	4	0	1	-7	-11
		2	1	1	-3
	4	2	2	-6	-14

Divide the polynomials using whatever method seems appropriate.

15) $(3x^3 + 4x^2 - 76x + 50) \div (x - 4)$

4	3	4	-76	50
		12	64	-48
	3	16	-12	2

$= 3x^2 + 16x - 12 + \frac{2}{x-4}$

16) $(2x^4 - 7x^2 - 14) \div (2x^2 + 1) = x^2 - 4 - \frac{10}{2x^2+1}$

$$x^2 + 0x - 4$$

$$2x^2 + 0x + 1 \overline{)\,2x^4 + 0x^3 - 7x^2 + 0x - 14}$$

$\underline{-2x^4 + 0x^3 - x^2}$

$-8x^2 + 0x - 14$

$\underline{-18x^2 - 0x + 4}$

-10

Determine if the second polynomial is a factor of the first one given (yes or no). Must show proof!

17) $x^3 + x^2 - 5x - 9$; $x - 2$

2	1	1	-5	-9
		2	6	2
	1	3	1	(-7)

No!

18) $x^4 - 5x^3 + 30x - 36$; $x - 3$

3	1	-5	0	30	-36
		3	-6	-18	36
	1	-2	-6	12	(0)

Yes!

Given a polynomial and one or more of its zeros, find the remaining zeros (roots).

19) $x^3 + 10x^2 + 26x + 8$; zero = -4

-4	1	10	26	8
		-4	-24	-8
	1	6	2	0

(run program or use quadratic formula)

zeros = $\underline{-3 \pm \sqrt{7}}$

20) $2x^5 + x^4 - 4x^2 - 32x$; roots = ±2

$= x(2x^4 + x^2 - 4x - 32)$; <u>root = 0</u>

2	2	1	0	-4	-32
		4	10	20	32

-2	2	5	10	16	0
		-4	-2	-16	
	2	1	8	0	

(program or quad form) $= \underline{\frac{-1 \pm 3i\sqrt{7}}{4}}$