Find all zeros by factoring.

1) $a^2 + 10a + 16 = 0$

A) $\{1, 8\}$ B) $\{1, -6\}$
C) $\{-5, 7\}$ D) $\{-2, -8\}$

2) $k^2 + 7k = 0$

A) $\{-8, 0\}$ B) $\{-7, 0\}$
C) $\{-7, 7\}$ D) $\{-6, 0\}$

3) $25n^2 + 35n - 8 = 0$

A) $\left\{-\frac{1}{5}, \frac{8}{5}\right\}$ B) $\left\{-\frac{7}{2}, -1\right\}$
C) $\left\{\frac{1}{5}, -\frac{8}{5}\right\}$ D) $\left\{\frac{6}{5}, 5\right\}$

Use a graphing calculator to find all zeros.

4) $f(x) = 3x^3 + 4x^2 - 4x$

A) $\left\{0, \frac{2}{3}, -2\right\}$ B) $\left\{0, -\frac{2}{3}, -2\right\}$
C) $\left\{0, \frac{2}{3}, -3\right\}$ D) $\{0, 2, -1\}$

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(13) $x = \sqrt{7}, -\sqrt{7}, 4$ (3)

$(x-\sqrt{7})(x+\sqrt{7})(x-4)$

	x	$+\sqrt{7}$
x	x^2	$\sqrt{7}x$
$-\sqrt{7}$	$-\sqrt{7}x$	-7

$x^2 - 7$

	x^2	-4
x	x^3	$-4x$
-7	$-7x$	28

$x^3 - 4x^2 - 7x + 28$

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(15) $x = 0, 2i, -2i$ (3)

$(x)(x-2i)(x+2i)$

	x	$2i$
x	x^2	$2ix$
$-2i$	$-2ix$	$-4i^2$

$-4i^2 = -4(-1) = 4$

$x^2 + 4$

$(x^2+4)(x)$

$x^3 + 4x$

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(5) $m^3 + 216$ sum of cubes

$(m+6)(m^2 - 6m + 36)$

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(2) $11n^2 = -n - 7$

$+n+7 \quad +n+7$

$11n^2 + n + 7 = 0$

$a \quad b \quad c$

$\frac{-1 \pm \sqrt{1 - 4(11 \cdot 7)}}{2 \cdot 11}$

$\frac{-1 \pm \sqrt{1 - 308}}{22}$

$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$\frac{-1 \pm \sqrt{-307}}{22}$

$\frac{-1 \pm i\sqrt{307}}{22}$

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2.4 Long Division

Remainder Theorem

When we divide a polynomial $f(x)$ by $(x-c)$ the remainder r equals $f(c)$.

$f(c) = r$

Factor Theorem

When you calculate $f(c)$ and it's zero that means the remainder is zero and $(x-c)$ must be a factor of the polynomial.

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ex4) $502 \div 3$

$$3\overline{)502} \quad 167 \text{ R } 1$$

-3

20

-18

22

-21

1

Sep 22-8:09 AM

ex5 $(8p^3 - 36p^2 - 25p + 26) \div (p-5)$

$8p^2 + 4p - 5$ R 1

$p-5 \;|\; 8p^3 - 36p^2 - 25p + 26$

$-8p^3 + 40p^2$

$0 + 4p^2 - 25p$

$-(4p^2 + 20p)$

$0 - 5p + 26$

$-(-5p + 25)$

$0 + 1$

$3\overline{)502}$

$(8p^3 - 40p^2)$

$-x - 2x$

$-3x$

$f(p) = (8p^2 + 4p - 5)(p-5) + 1$

$f(c) = r \quad (p-5) \; c = 5$

$(x-c)$

$f(5) = 8(5)^3 - 36(5)^2 - 25(5) + 26$

$= 8(125) - 36(25) - 125 + 26$

$= 1000 - 900 - 125 + 26$

$= 100 - 125 + 26$

$f(c) = r \quad = -25 + 26$

$= 1$

Sep 22-8:12 AM

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ex2) $(m^2 + m - 20) \div (m-5)$

$r =$ has to be zero

$f(c) = r$

$(m-5) \; c = 5$

$(m-5)$ not a factor

$f(5) = (5)^2 + (5) - 20$

$f(5) = 25 + 5 - 20$

$= 30 - 20 = 10$

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ex1 $n^4 - 3n^3 + 2n^2 - 4 \quad n = -2$

$f(-2) = (-2)^4 - 3(-2)^3 + 2(-2)^2 - 4$

$= 16 + 24 + 8 - 4$

$= 40 + 4$

$= 44$

$r = 44$

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ex3 $(x^3 - 4x^2 + 2x - 4) \div (x+1)$

$f(c) = r$

$x + 1 = 0$

$-1 \quad -1$

$x = -1$

$c = -1$

$f(-1) = (-1)^3 - 4(-1)^2 + 2(-1) - 4$

$= -1 - 4 - 2 - 4$

$= -11$

not a factor

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ex6 $(v^3 - 4v^2 + 11v - 15) \div v - 3$

$v^2 - v + 8$ r 9

$v-3 \overline{)\, v^3 - 4v^2 + 11v - 15}$

$-v^3 + 3v^2$

$0 - v^2 + 11v$

$+v^2 \mp 3v$

$0 \quad 8v - 15$

$-8v + 24$

$0 + 9$

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⑥ $(n^2 + 6n + 9) \div (n+3)$

$f(c) = r$

$-3 = c$

$(n+3)$ is a factor

$f(-3) = (-3)^2 + 6(-3) + 9$

$= 9 - 18 + 9$

$= 18 - 18$

$= 0$

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