Name:_____   Date:_____
PC: Long Division of Polynomials   Ms. Loughran

Do Now: dividend
         ↓
              ← divisor
1. Divide 546 by 4 using long division.

$$\begin{array}{r} 136 \leftarrow \text{quotient} \\ 4\overline{)546} \\ \underline{4} \\ 14 \\ \underline{12} \\ 26 \\ \underline{24} \\ 2 \text{ remainder} \end{array}$$

Quotient + $\dfrac{\text{Remainder}}{\text{Divisor}}$ form

$136 + \dfrac{2}{4}$

To check
$(136)(4) + 2 = 546$
(Quotient)(Divisor) + Remainder = Dividend

Divide using long division.

1. $(m^2 - 7m - 11) \div (m - 8)$

$$\begin{array}{r} m + 1 \quad \text{quotient} \\ m-8\overline{)m^2 - 7m - 11} \\ \underline{-m^2 + 8m} \\ m - 11 \\ \underline{-m + 8} \\ -3 \leftarrow \text{remainder} \end{array}$$

Quotient + $\dfrac{\text{Remainder}}{\text{Divisor}}$ form

$m + 1 + \dfrac{-3}{m-8}$

$m + 1 - \dfrac{3}{m-8}$

check : (Quotient)(Divisor) + Remainder = Dividend
$(m+1)(m-8) + (-3)$
$m^2 - 7m - 8 + (-3) = m^2 - 7m - 11$ ✓

3. $(n^2 + 10n + 18) \div (n + 5)$

$$
\begin{array}{r}
n + 5 \\
n + 5 \enclose{longdiv}{n^2 + 10n + 18} \\
-\underline{n^2 + 5n} \\
5n + 18 \\
-\underline{5n + 25} \\
-7
\end{array}
$$

$$n + 5 + \frac{-7}{n+5}$$

$$n + 5 - \frac{7}{n+5}$$

5. $(n^2 - 3n - 21) \div (n - 7)$

$$
\begin{array}{r}
n + 4 \\
n - 7 \enclose{longdiv}{n^2 - 3n - 21} \\
-\underline{n^2 + 7n} \\
4n - 21 \\
-\underline{4n + 28} \\
7
\end{array}
$$

$$n + 4 + \frac{7}{n-7}$$

7. $(r^2 + 14r + 38) \div (r + 8)$

$$
\begin{array}{r}
r + 6 \\
r + 8 \enclose{longdiv}{r^2 + 14r + 38} \\
-\underline{r^2 + 8r} \\
6r + 38 \\
-\underline{6r + 48} \\
-10
\end{array}
$$

$$r + 6 - \frac{10}{r+8}$$

9. $(2x^2 - 17x - 38) \div (2x + 3)$

$$
\begin{array}{r}
x - 10 \\
2x+3 \overline{\smash{)}\ 2x^2 - 17x - 38} \\
-2x^2 + 3x \\
\hline
-20x - 38 \\
+20x + 30 \\
\hline
-8
\end{array}
$$

$$x - 10 - \frac{8}{2x+3}$$

skips the x term

11. $(x^2 - 74) \div (x - 8)$

$$
\begin{array}{r}
x + 8 \\
x-8 \overline{\smash{)}\ x^2 \qquad\quad - 74} \\
-x^2 + 8x \\
\hline
8x - 74 \\
-8x + 64 \\
\hline
-10
\end{array}
$$

$$x + 8 - \frac{10}{x-8}$$

13. $(n^3 + 7n^2 + 14n + 3) \div (n + 2)$

$$
\begin{array}{r}
n^2 + 5n + 4 \\
n+2 \overline{\smash{)}\ n^3 + 7n^2 + 14n + 3} \\
-n^3 + 2n^2 \\
\hline
5n^2 + 14n \\
-5n^2 + 10n \\
\hline
4n + 3 \\
-4n + 8 \\
\hline
-5
\end{array}
$$

$$n^2 + 5n + 4 - \frac{5}{n+2}$$

15. $(v^3 - 2v^2 - 14v - 5) \div (v + 3)$

$$
\begin{array}{r}
v^2 - 5v + 1 \\
v+3 \overline{)\, v^3 - 2v^2 - 14v - 5} \\
v^3 + 3v^2 \\
\hline
-5v^2 - 14v - 5 \\
-5v^2 - 15v \\
\hline
v - 5 \\
v + 3 \\
\hline
-8
\end{array}
$$

$v^2 - 5v + 1 - \dfrac{8}{v+3}$

17. $(-18 - 4k^2 - 30k + k^3) \div (3 + k)$ put dividend + divisor in standard form (rearrange)

$$
\begin{array}{r}
k^2 - 7k - 9 \\
k+3 \overline{)\, k^3 - 4k^2 - 30k - 18} \\
-k^3 + 3k^2 \\
\hline
-7k^2 - 30k \\
+7k^2 + 21k \\
\hline
-9k - 18 \\
+9k + 27 \\
\hline
9
\end{array}
$$

$k^2 - 7k - 9 + \dfrac{9}{k+3}$

19. $(-7 + x^3 - 32x + 5x^2) \div (x - 4)$

$$
\begin{array}{r}
x^2 + 9x + 4 \\
x-4 \overline{)\, x^3 + 5x^2 - 32x - 7} \\
x^3 - 4x^2 \\
\hline
9x^2 - 32x \\
9x^2 - 36x \\
\hline
4x - 7 \\
4x - 16 \\
\hline
9
\end{array}
$$

$x^2 + 9x + 4 + \dfrac{9}{x-4}$
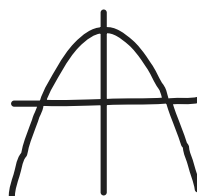
Homework 11-27

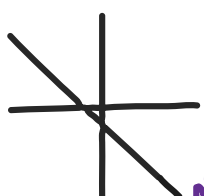<div style="text-align: center">More Practice</div>

1. Indicate which of the following functions are even, which are odd, and which are neither.
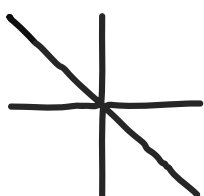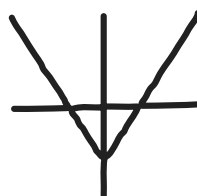

Graph (a) **ODD**

Graph (b) **EVEN**

Graph (c) **NEITHER**

Graph (d) **EVEN**

2. Algebraically, determine whether each function is odd, even, or neither

   a) $f(x) = 3x^4 - 5x^2 + 17$
   EVEN

   b) $f(x) = |x|$
   EVEN

   c) $f(x) = 12x^7 + 6x^3 - 2x$
   ODD

   d) $f(x) = 4x^3 - 7$
   NEITHER

   e) $f(x) = x^2 + 2x + 2$
   NEITHER

   f) $f(x) = \dfrac{x^2 - 5}{2x^3 + x}$ **ODD** compare

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f) $f(-x) = \dfrac{(-x)^2 - 5}{2(-x)^3 + (-x)} = \dfrac{x^2 - 5}{-2x^3 - x}$

$\dfrac{x^2 - 5}{-(2x^3 + x)} = -1 \cdot \dfrac{x^2 - 5}{2x^3 + x}$