Unit 3 Review
Secondary III

Name: KEY
Date: DUE   Class: B7/A3

1. Are $(x+2)$ and $(x-6)$ factors of $f(x) = 2x^3 + 8x^2 - 22x - 60$?

```
-2| 2   8   -22   -60
        -4   -8    60
   2   4   -30    |0
```

```
6| 2   8   -22   -60
       12   120   588
   2  20    98   |528
```

$(x+2)$ YES

$(x-6)$ NO

Find **all** the factors and zeros of the following functions. ✗ USE CALCULATOR

2. $g(x) = x^3 + 4x^2 + 4x$

$x = 0, -2$ ← zeros

$x(x+2)^2$ ← factors

3. $h(x) = 3x^3 - 2x^2 - 3x + 2$

$(3x-2)(x+1)(x-1)$ ← Factors

$x = -1, \frac{2}{3}, 1$ ← zeros

4. $g(x) = 3x^3 - 8x^2 + 3x + 2$

$(x-1)(3x+1)(x-2)$ ← factors

$x = -\frac{1}{3}, 1, 2$ ← zeros

5. $k(x) = 7x^3 + x^2 - 28x - 4$

$(x+2)(x-2)(7x+1)$ ← factors

$x = -2, -\frac{1}{7}, 2$ ← zeros

Given the following zeros and multiplicities, write a function in factored form

6. 2 (multiplicity of 3), 5, −7(multiplicity of 2)

$(x-2)^3(x-5)(x+7)^2$
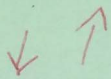
7. 4, 2(multiplicity of 5), -3

$(x-4)(x-2)^5(x+3)$

For the following functions, find the zeros, state the multiplicity at each zero, state the end behavior, and sketch a graph by hand.
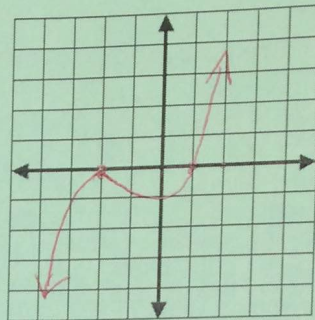
8. $f(x) = (x+2)^2(x-1)$

Zeros	Multiplicity	Intersection
-2	2	TANGENT
1	1	STRAIGHT

End Behavior:

↓ ↑

AS $x \to -\infty$, $f(x) \to -\infty$

AS $x \to +\infty$, $f(x) \to +\infty$

9. $h(x) = x(x+3)^2(x-2)^3$

Zeros	Multiplicity	Intersection
0	1	STRAIGHT
-3	2	TANGENT
2	3	INFLECTION

End Behavior:

↖ ↗

AS $x \to -\infty$, $f(x) = +\infty$

AS $x \to +\infty$, $f(x) \to +\infty$
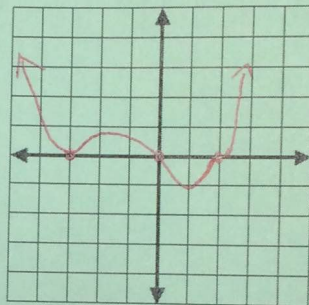
For the following functions graph on your calculator, state the zeros and multiplicity, write in factored form, and analyze.

10. $f(x) = x^3 - x^2 - 6x$

Zeros	Multiplicity	Intersection
-2	1	STRAIGHT
0	1	STRAIGHT
3	1	STRAIGHT

Factored form: $x(x-3)(x+2)$
Domain: $\mathbb{R}$
End Behavior:

↓ ↑

AS $x \to -\infty$, $f(x) \to -\infty$

AS $x \to +\infty$, $f(x) \to +\infty$

11. $g(x) = x^4 - 17x^2 + 16$

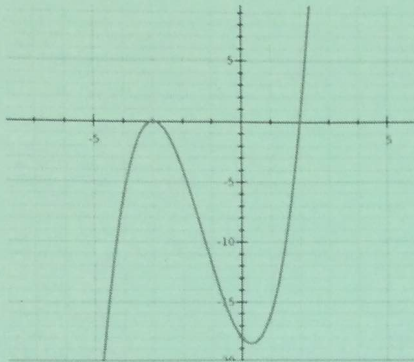| Zeros	Multiplicity	Intersection
-4	1	STRAIGHT
-1	1	STRAIGHT
1	1	STRAIGHT
4	1	STRAIGHT

Factored form: $(x-4)(x+4)(x+1)(x-1)$
Domain: $\mathbb{R}$
End Behavior:

↖ ↑

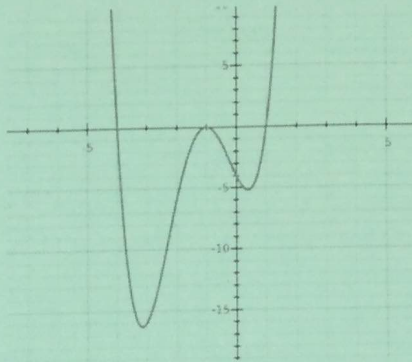AS $x \to -\infty$, $f(x) \to +\infty$

AS $x \to +\infty$, $f(x) \to +\infty$

Write an equation in factored form to represent the following graphs

12.

$(x+3)^2(x-2)$

13.

$(x+4)(x+1)^2(x-1)$

14. Is (x-2) a factor of $x^3 - 3x^2 - x + 3$?

$$
\begin{array}{r|rrrr}
2] & 1 & -3 & -1 & 3 \\
  &   & 2 & -2 & -6 \\
\hline
  & 1 & -1 & -3 & \underline{-3}
\end{array}
$$
  NO

15. Is (x+5) a factor of $x^3 - 7x^2 + 10x + 6$

$$
\begin{array}{r|rrrr}
-5] & 1 & -7 & 10 & 6 \\
   &   & -5 & 60 & -350 \\
\hline
   & 1 & -12 & 70 & \underline{-344}
\end{array}
$$
  NO

16. Find the interval where $x^3 - 4x^2 - 4x + 16 > 0$
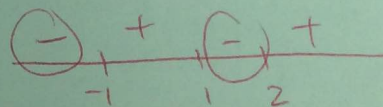
$(x+2)(x-2)(x-4)$

$x = -2, 2, 4$
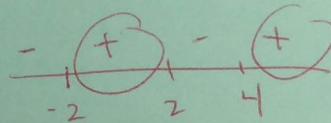
$$\boxed{(-2, 2) \cup (4, \infty)}$$

17. Find the interval where $x^3 - 2x^2 - x + 2 < 0$

$(x-2)(x+1)(x-1)$

$x = -1, 1, 2$

$$\boxed{(-\infty, -1) \cup (1, 2)}$$