COLLEGE ALGEBRA

NAME: Holly Gasper

GPS # 33 **4.1** **POLYNOMIAL FUNCTIONS** Class Time: T/Th 11:30 Date: 3-25-08

Useful Guidelines:

To Graph a Polynomial function, $f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_1 x + a_0$, $a_n \neq 0$

* Step 1: Find the x-intercepts, if any (by solving the equation $f(x) = 0$), and the y-intercepts, $f(0)$.
* Step 2: Determine whether the graph crosses (when r is a zero of odd multiplicity) or touches (when r is a zero of even multiplicity) the x-axis at each x-intercepts.
* Step 3: Check the end behavior: For large $|x|$, the graph of f behaves like the graph of $f(x) = a_n x^n$.
* Step 4: Determine the degree of $f = n$ and the maximum number of turning points on the graph of $f = n-1$.
* Step 5: Use the x-intercept(s) to find the intervals on which f is above the x-axis and the intervals on which f is above the x-axis. [Hint: pick a point between the zeros.]
* Step 6: Plot the points and connect them with a smooth and continuous curve.

[r is called a (real) **zero of f**, or **root of f** when $f(r) = 0$]

Good job!

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

(a) Find the x-intercepts and the y-intercepts of the above polynomial function f.

$(x-2)=0$ or $(x+4)=0$ $f(0) = 16$ y-intercepts

$x = 2$ $x = -4$ $(0,16)$

$(2,0)$ $(-4,0)$

(b) Determine whether the graph touches or crosses the x-axis at each x-intercept.

- At $x = 2$, the graph touches because the zero has an even multipicity
- At $x = -4$, the graph crosses because the zero has an odd mult.

(c) Check end behavior: Find the power function that the graph of f resembles for large values of $|x|$.

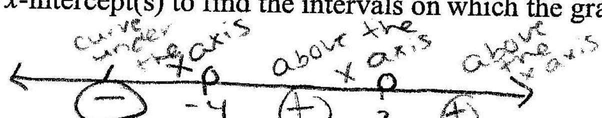
It will resemble $y = x^3$ for large value of $|x|$

(d) Determine the maximum number of turning points of the graph of f.

Since $n=3$, the maximum number of turning point $= n-1$
$= 3-1$
$= 2$

$= 2$

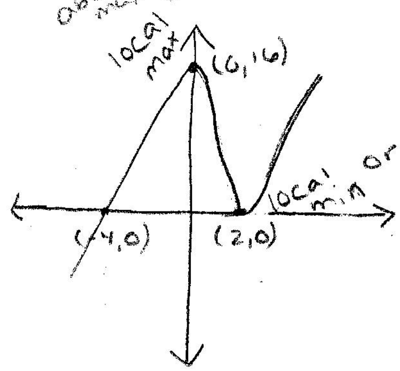
(e) Use the x-intercept(s) to find the intervals on which the graph of f is above and below the x-axis.



$f(-5) = (-5-2)^2(-5+4)$

$f(-5) = -49$

(f) Plot the points and connect them with a smooth and continuous curve.



$f(0) = (0-2)^2(0+4)$

$f(0) = 16$

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

$f(3) = 7$