COLLEGE ALGEBRA NAME: Brook Bennett

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

20/20 Good Job!

Useful Guidelines:

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

* 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 $f(r) = 0$]

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

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

y-int = (0,16) x-int (-4,0) (2,0)

(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 multiplicity.
at x=-4, the graph crosses because the zero has an odd multiplicity.

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

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

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

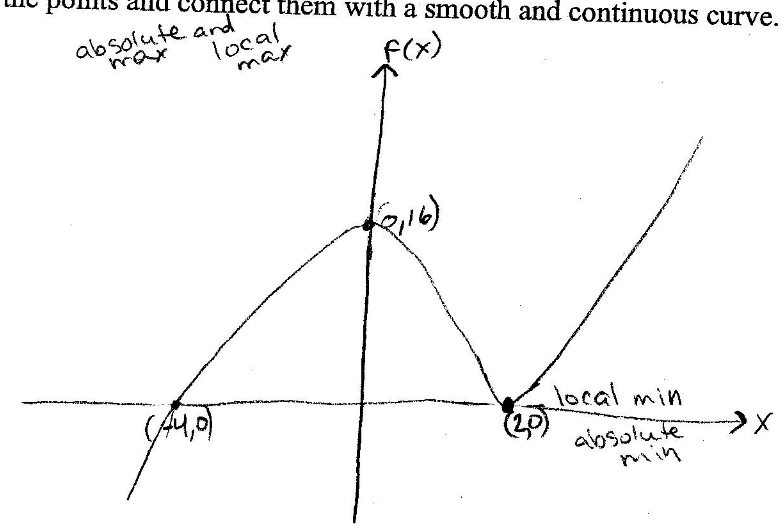
Since n=3, the max amount of turning points is 2 $n-1$, $3-1$, $=2$

(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) = -49 f(0) = 16 f(3) = 7

(−) -4 (+) 2 (+)

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



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