MATH 125 College Algebra Name______________________________

Polynomial Functions $f(x) = a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + a_{n-3}x^{n-3} + \ldots + a_n x^1 + a_0$

n is the greatest power on a variable and it must be a whole number.

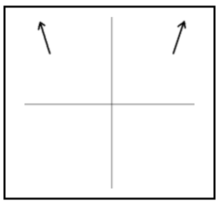
Every polynomial function is continuous over $(-\infty, \infty)$, which is also the domain of every polynomial function.

Degree of the Polynomial is n. The Leading Coefficient of the Polynomial is a.

End Behavior

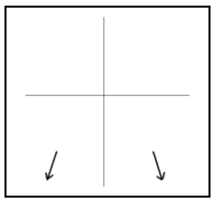
n is Even

$a > 0$



$\left\{ \begin{array}{l} \text{As } x \to \infty, \ y \to \infty \\ \textit{The graph rises to the right.} \\ \text{As } x \to -\infty, \ y \to \infty \\ \textit{The graph rises to the left.} \end{array} \right\}$

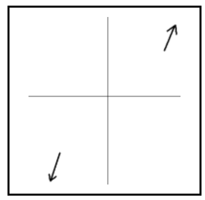
$a < 0$



$\left\{ \begin{array}{l} \text{As } x \to \infty, \ y \to -\infty \\ \textit{The graph falls to the right.} \\ \text{As } x \to -\infty, \ y \to -\infty \\ \textit{The graph falls to the left.} \end{array} \right\}$

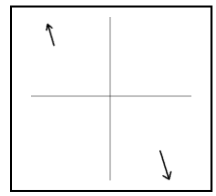
n is Odd

$a > 0$



$\left\{ \begin{array}{l} \text{As } x \to \infty, \ y \to \infty \\ \textit{The graph rises to the right.} \\ \text{As } x \to -\infty, \ y \to -\infty \\ \textit{The graph falls to the left.} \end{array} \right\}$

$a < 0$



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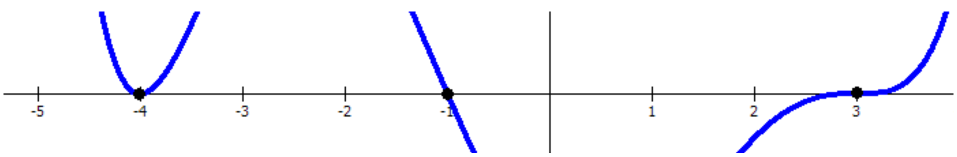
Factors of a polynomial function $P(x)$ based upon the graph behavior below.



$(x+4)^2, \ (x+4)^4, \ (x+4)^6, \ (x+4)^8, \ (x+4)^{10}, \ \ldots$ are possible factors (including their multiplcity) of $P(x)$

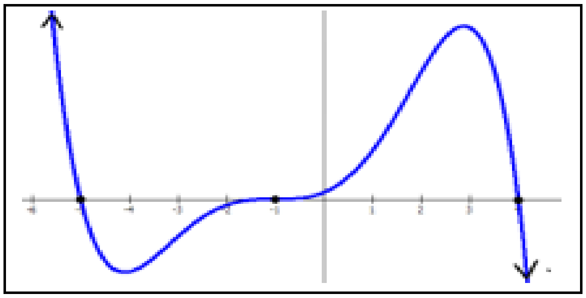
$(x-3)^3, \ (x-3)^5, \ (x-3)^7, \ (x-3)^9, \ (x-3)^{11}, \ \ldots$ are possible factors of (including their multiplcity) $P(x)$

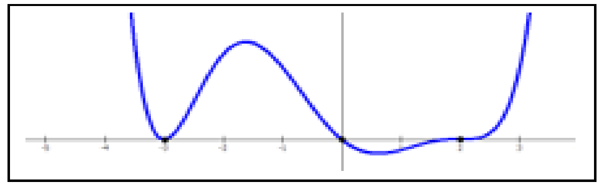
$(x+1)$ is a factor of $P(x)$

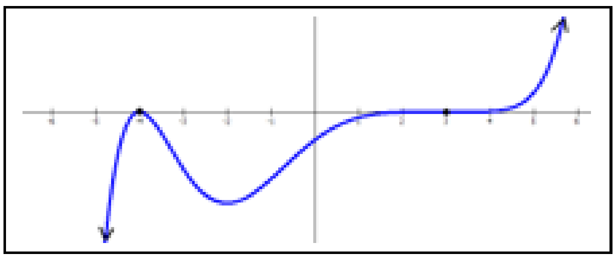
Lowest powers for $P(x) = a(x+4)^2(x+1)(x-3)^3$ is a polynomial with zeros of ________________________

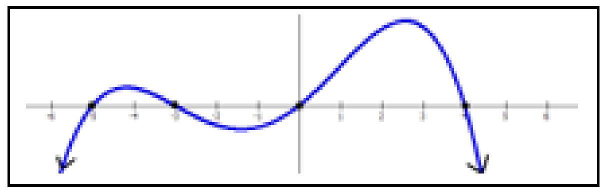
$Q(x)$ is a polynomial with zeros of 0 (multiplicity 1), 3 (multiplicity 2), and -1 (multiplicity 3) and $Q(1) = -96$

For each polynomial function graphed below write a possible function (with least degree) based upon the graph behavior at the x-axis.









<u>Intermediate Value Theorem</u>

If f is a continuous functon over $[\,a,\, b\,]$ and $f(a) \neq f(b)$,
then for all N between $f(a)$ and $f(b)$ there exists c in $(\,a,\, b\,)$ such that $f(c) = N$.

Show that $g(x) = 2x^5 - 8x^3 + 4$ has a root (zero value) between $x = 1$ *and* $x = 2$.

Determine the end behavior of each function

$f(x) = 2x^7 + 4x^4 - x^3 + 5x - 6$

$g(x) = -2x^6 + x^5 - 3x^2 + 5x - 10$

$p(x) = -5(x-4)^2(x+1)^3$

$q(x) = 2x(x-2)(x+5)^4$