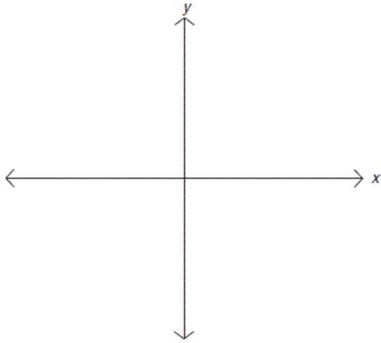


## End Behavior and Multiplicities of Zeros

Period \_\_\_\_\_

Sketch the general shape of each function and then describe the end behavior using **limit notation**.

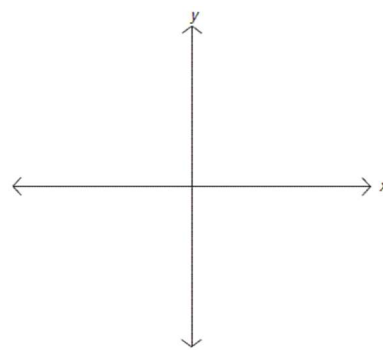
1.  $f(x) = x^3 - 2x^2 - 2$



$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

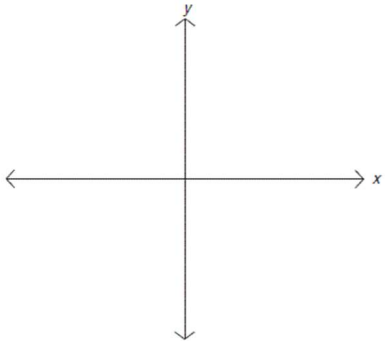
2.  $f(x) = x^2 + 8x + 18$



$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

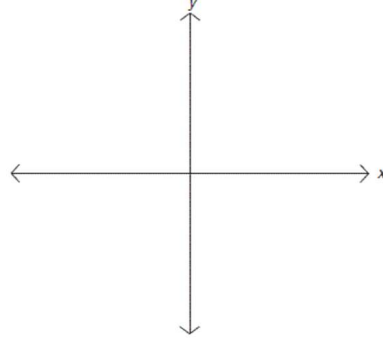
3.  $f(x) = -x^5 + 3x^3 + 2x + 2$



$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

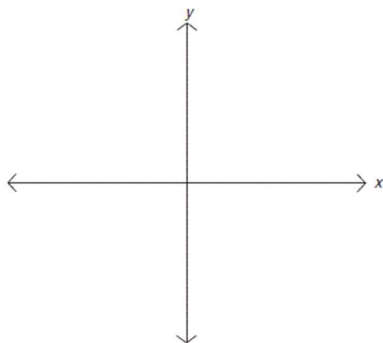
4.  $f(x) = x^4 - 3x^2 + 3x$



$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

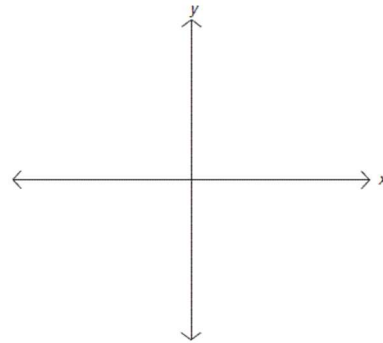
5.  $f(x) = x^5 - 3x^3 + x + 3$



$$\lim_{x \rightarrow \infty} f(x) =$$

$$\lim_{x \rightarrow -\infty} f(x) =$$

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



$$\lim_{x \rightarrow \infty} f(x) =$$

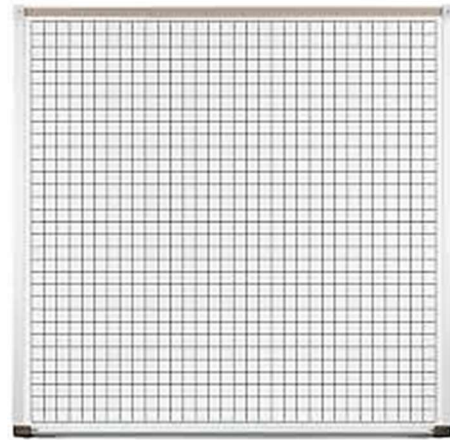
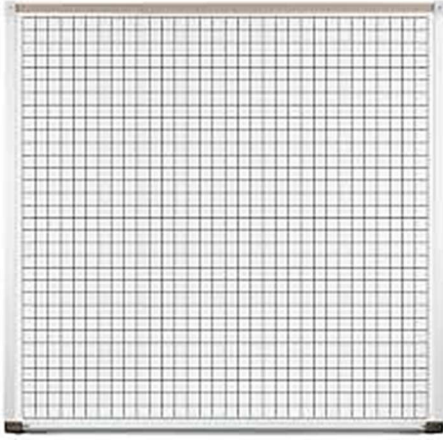
$$\lim_{x \rightarrow -\infty} f(x) =$$



Without using technology, sketch each polynomial. Label the axes and points (zeros need to be labeled and placed correctly on the graph).

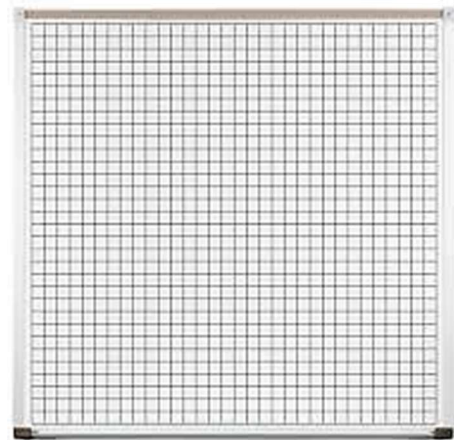
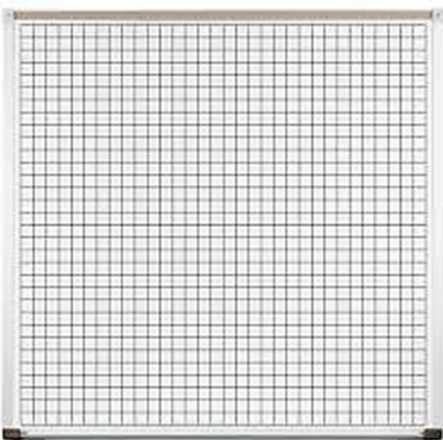
15.  $f(x) = x^3 - 4x$

16.  $f(x) = (x^2 - 4)(x^2 - 1)$

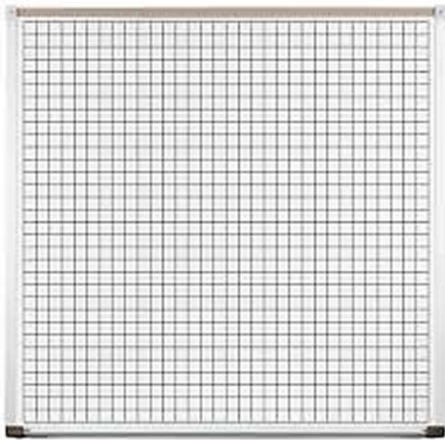


17.  $f(x) = (x^2 - 1)(x^2 - 9)(x + 2)$

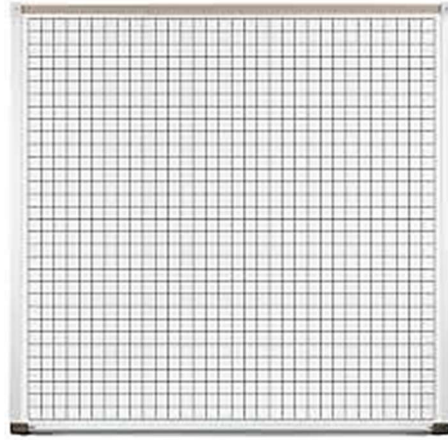
18.  $f(x) = (x^2 - 1)(x^2 - 9)(x^2 - 4)$



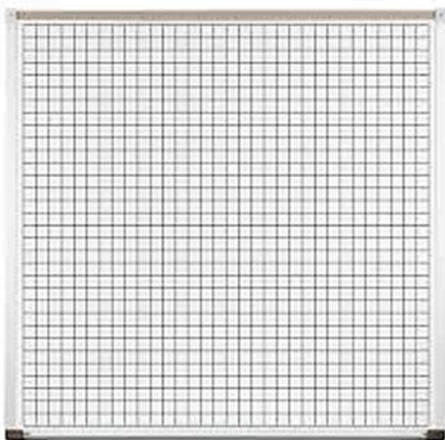
19.  $f(x) = (x - 4)^2(x + 2)$



20.  $f(x) = (x - 3)^2(x + 5)^2(x - 1)$



21.  $f(x) = (x + 2)^4(x - 1)^5$



22.  $f(x) = (x - 4)^3(x + 1)^2$

