Free Response Practice #15
Calculator NOT Permitted

Consider the following polynomial function $f(x) = -2x^3 - x^2 + 13x - 6$ to answer the following questions.

a. What is the left and right hand behavior of $f(x)$? Justify your answer.

f(x) is ODD degree with negative lead coefficient. +1

$\therefore \lim_{x\to\infty} f(x) = -\infty$ and $\lim_{x\to-\infty} f(x) = \infty$ +1

b. If $(x + 3)$ is a factor of $f(x)$ rewrite $f(x)$ in completely factored form and identify the zeros of $f(x)$.

zero: -3

$$\begin{array}{r|rrrr} \boxed{-3} & -2 & -1 & 13 & -6 \\ & 0 & 6 & -15 & 6 \\ \hline & -2 & 5 & -2 & \boxed{0} \end{array}$$

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

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

$= -(x+3)[\underbrace{2x^2-4x}\ \underbrace{-x+2}]$

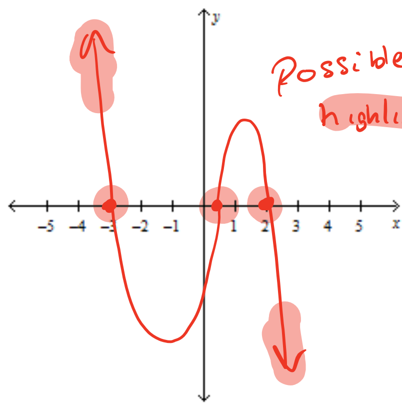
$= -(x+3)[2x(x-2)-1(x-2)]$

$f(x) = -(x+3)(x-2)(2x-1)$ +1 +1

Zeros of f(x) are $x = -3, \frac{1}{2}, 2$ +1

c. Sketch a graph of $f(x)$ using the identified left and right hand behavior above and the zeros of $f(x)$.

+1

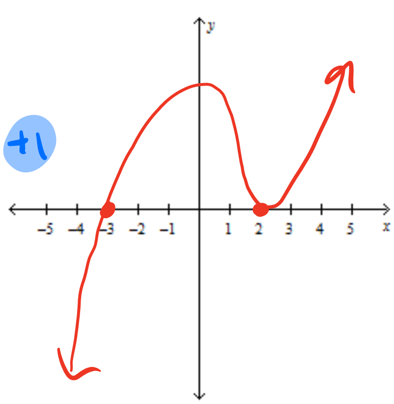


Possible graph

highlighted parts required

d. Suppose a cubic polynomial function with a positive leading coefficient, $g(x)$, is such that $x = -3$ is a root of multiplicity 1 and $x = 2$ is a root of multiplicity 2. Sketch a possible graph of $g(x)$. Explain how you developed your graph.

+1



- g(x) is odd with leading positive leading coefficent +1

  $\therefore \lim_{x\to\infty} g(x) = \infty$, $\lim_{x\to-\infty} g(x) = -\infty$

- g(x) has root at $x=-3$ of ODD multiplicity = 1

  $\therefore$ g(x) crosses the x-axis at $x=-3$ w/o changing concavity

- g(x) has root at $x=2$ of Even Multiplicity = 2

  $\therefore$ g(x) is tangent to x-axis at $x=2$

+1