

WORKSHEET 3: 18 points

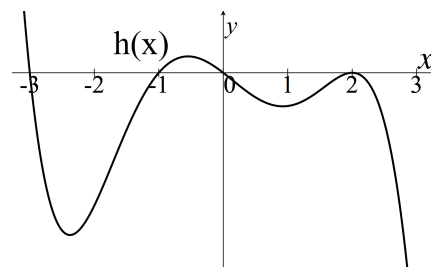
Math 6B-030, Spring 2021

Due: Friday, April 23rd, 11:59pm via Gradescope

Question 1 (3 points) Let $f(x)$ is a polynomial:

- whose only zeros occur at $x = -5$ and $x = 3$
 - that changes sign at $x = -5$ and keeps its sign at $x = 3$
 - the end behaviour as $x \rightarrow +\infty$ is that $f(x) \rightarrow -\infty$
- (a). (2 points) Sketch by hand a polynomial that satisfies these conditions. Label the axes and zeroes.
- (b). (1 point) Write one possible equation for $f(x)$. *Note: there are many possible equations.*

Question 2 (8 points) Let $h(x)$ be given by the graph.



- (a). (3 points) List all of the zeros of $h(x)$.
For each zero, determine if it is of even or odd multiplicity.
- (b). (1 point) Is $h(x)$ of even degree, of odd degree, or not enough information to know?
Justify completely to receive any credit.
- (c). (1 point) Is the coefficient on the leading term of $h(x)$ positive, negative, or not enough information to know? *Justify completely to receive any credit.*
- (d). (1 point) Determine the end behavior of $h(x)$ as $x \rightarrow -\infty$ and $x \rightarrow +\infty$?
- (e). (2 points) Use your answers in (a)-(d) to write a possible equation for $h(x)$. *Note: there are many possible equations.*

Question 3 (7 points) Let $p(x) = 4x^2(2x - 3)$, $q(x) = -4(x - 5)(x - 2)^3$ and $f(x) = \frac{p(x)}{q(x)}$.

- (a). (1 point) Fill in the following tables. If undefined, write DNE.
You may use a calculator or Desmos to evaluate (tip: try the table feature on Desmos).

x	1.9	1.92	1.94	1.96	1.98	2
f(x)						

x	2.1	2.08	2.06	2.04	2.02	2
f(x)						

- (b). (1 point) Determine what happens to $f(x)$ as $x \rightarrow 2^-$ and as $x \rightarrow 2^+$.
- (c). (1 point) Explain in words what (b) means. What kind of feature occurs at $x = 2$?
- (d). (1 point) What are the leading terms of $p(x)$ and $q(x)$.
- (e). (2 points) Determine the end behavior of $p(x)$, $q(x)$ and $f(x)$ as $x \rightarrow +\infty$.
- (f). (1 point) Does $f(x)$ have a horizontal asymptote and, if so, where? Explain.
Note: Horizontal asymptotes are lines and must be expressed as lines