SHOW ALL WORK FOR FULL CREDIT - CIRCLE YOUR FINAL ANSWER EXACT ANSWERS ONLY - WRITE ALL ANSWERS IN SIMPLEST FORM DUE: TUESDAY, APRIL 16, AT THE BEGINNING OF CLASS

1. (1 pt) Use the Rational Zero Theorem to list all possible rational zeros of

$$
f(x)=9 x^{5}-6 x^{4}+3 x^{3}-7 x+8
$$

2. (1 pt) Find a polynomial function with zeros $x=\frac{7}{9}$ (multiplicity 3 ), $x=0$ (multiplicity 2 ), and $x=-3$ (multiplicity 4). Please leave your answer in factored form.
3. Given below is the graph of $f$.

(a) ( 0.5 pt ) Is the degree of $f$ even or odd?
(b) ( 0.5 pt ) Is the leading coefficient of $f$ positive or negative?
(c) (0.5 pt) Determine the interval(s) where $f(x) \geq 0$.
(d) (0.5 pt) Determine the interval(s) where $f(x)<0$.
(e) (1 pt) List the real zeros of $f$ AND state whether each zero has even or odd multiplicity.
4. $(2 \mathrm{pts})$ Solve: $\quad 6(3 x-8)^{3}=48$
5. (2 pts) Solve: $\quad 45 x^{3}+24 x^{2}-48 x=0$
6. $(2$ pts $)$ Solve: $\quad 24 x^{3}-28 x^{2}-30 x+35=0$
7. (1 pt) Use synthetic division to divide

$$
P(x)=3 x^{5}-4 x^{3}+9 x^{2}+2 x-5 \quad \text { by } \quad x+2 .
$$

Identify the quotient and remainder. Be specific.
8. (3 pts) Find all zeros of $f(x)=18 x^{3}+51 x^{2}+6 x-18$. You must show all work.

9. Consider $P(x)=4 x^{5}-12 x^{4}-87 x^{3}+160 x^{2}+168 x-288$ whose graph is given below.

(a) (1 pt) Show that $x=\frac{3}{2}$ is a zero.
(b) (4 pts) Find all other zeros of $P$. You must show all work. (Show algebraically that they are zeros).

