6. [10 points] All problems below are independent of each other.

a. [3 points] Let $m(x) = (1+x^2)^{3x-4}$. Circle the limit below that represents $m'(2)$. There is only one correct answer.

(A) $\lim_{h\to 0} \dfrac{(1+x^2)^{3x-4}+h-25}{h}$

(B) $\lim_{h\to 0} \dfrac{(1+h^2)^{3h-4}-25}{h}$

(C) $\lim_{h\to 0} \dfrac{(1+(2+h)^2)^{3h-4}-25}{h}$

(D) $\lim_{h\to 0} \dfrac{(1+(2+h)^2)^{3h+2}-25}{h}$

(E) $\lim_{h\to 0} \dfrac{(5+h^2)^{3h+2}-25}{h}$

(F) $\lim_{h\to 2} \dfrac{(1+h^2)^{3h+2}-25}{h}$

b. [4 points] Let $p(x)$ be a polynomial satisfying all the following properties:

(i) $p(x) = 0$ only at $x = -2, 0, 3$.

(ii) $\lim_{x\to-\infty} p(x) = -\infty$ and $\lim_{x\to\infty} p(x) = -\infty$.

Find one possible formula for $p(x)$. There may be more than one correct answer.

Answer: $p(x) =$ _____

c. [3 points] Let $h(x)$ be a rational function satisfying all the following properties:

(i) $\lim_{x\to 2} h(x) = 0$ and h is not defined at $x = 2$.

(ii) $\lim_{x\to\infty} h(x) = 0$.

Find one possible formula for $h(x)$. There may be more than one correct answer.

Answer: $h(x) =$ _____