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) $\lim_{h \to 0} \frac{(1 + x^2)^{3x-4} + h - 25}{h}$
(B) $\lim_{h \to 0} \frac{(1 + h^2)^{3x-4} - 25}{h}$
(C) $\lim_{h \to 0} \frac{(1 + (2 + h)^2)^{3x-4} - 25}{h}$
(D) $\lim_{h \to 0} \frac{(1 + (2 + h)^2)^{3h+2} - 25}{h}$
(E) $\lim_{h \to 0} \frac{(5 + h^2)^{3h+2} - 25}{h}$
(F) $\lim_{h \to 2} \frac{(1 + h^2)^{3h+2} - 25}{h}$

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:** $p(x) = \frac{1}{2}x^2 - 3x - 2$

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:** $h(x) = \frac{3x^2}{x+2}$