10. [11 points] In each situation, circle all of the statements I-VI which must be true. If none of the statements must be true, circle VII. NONE OF THE ABOVE.

a. [3 points] Let $f(x) = qe^{rx} + s$, where q, r, and s are negative constants.

I. $f(0) > 0$

II. $\boxed{f'(0) > 0}$

III. $\boxed{\lim_{x\to\infty} f(x) = s}$

IV. $\lim_{x\to\infty} f(x) = 0$

V. $\lim_{x\to-\infty} f(x) = s$

VI. $\lim_{x\to-\infty} f(x) = 0$

VII. NONE OF THE ABOVE

b. [4 points] Let $g(x) = a\ln(bx)$, where a and b are positive constants.

I. $\boxed{\text{The domain of } g(x) \text{ is the interval } (0,\infty).}$

II. The graph of $g(x)$ has a horizontal asymptote.

III. $\boxed{\text{The graph of } g(x) \text{ has a vertical asymptote.}}$

IV. $\boxed{g^{-1}(0) = b^{-1}}$

V. $g'(x) = \dfrac{a}{bx}$

VI. $\boxed{\int g(x)\,dx = ax(\ln(bx) - 1) + C}$

VII. NONE OF THE ABOVE

c. [4 points] Let $z(t) = A\sin t + B$, where A and B are positive constants.

I. $\boxed{\text{The maximum value of } z(t) \text{ on its domain is } A + B.}$

II. $\boxed{z(t) \text{ has an inflection point at } t = 0.}$

III. $\boxed{\text{If } h(t) = z(z(t)), \text{ then } h'(0) = A^2\cos B.}$

IV. $\int_0^{2\pi} z(t)\,dt = 0$

V. $\boxed{\int_0^{\pi} z(t)\,dt = 2A + \pi B}$

VI. $\boxed{\int_1^2 z(t)\,dt = \int_{1+2\pi}^{2+2\pi} z(t)\,dt}$

VII. NONE OF THE ABOVE