11. [12 points] For each of the questions below, circle all of the available correct answers. Circle "NONE OF THESE" if none of the available choices are correct. No credit will be awarded for unclear markings. No justification is necessary.

a. [4 points] Suppose $f(x)$ is defined and continuous on $(-\infty, \infty)$. Which of the following MUST be true?

i. If a and b are constants with $a \neq b$, then $F(x) = \int_a^x f(t)\, dt$ and $G(x) = \int_b^x f(t)\, dt$ are different functions.

ii. The function $F(x) = \int_a^x f(t)\, dt$ is an antiderivative of $f(x)$ with the property that $F(a) = 0$.

iii. Every antiderivative of $f(x)$ is equal to $\int_c^x f(t)\, dt$, for some choice of constant c.

iv. The function $J(x) = \int_{-x}^2 f(-t)\, dt$ is an antiderivative of $f(x)$.

v. NONE OF THESE

b. [4 points] Suppose $g(t)$ has a positive second derivative for all values of t. Also suppose LEFT(10), RIGHT(10), TRAP(10), and MID(10) are all estimates of the integral $\int_2^5 g(t)\, dt$. Which of the following are POSSIBLE?

i. $\int_2^5 g(t)\, dt < \text{RIGHT}(10)$

ii. $\int_2^5 g(t)\, dt < \text{TRAP}(10)$

iii. $\int_2^5 g(t)\, dt < \text{MID}(10)$

iv. LEFT(10) = TRAP(10) + 100 and RIGHT(10) = TRAP(10) + 50

v. LEFT(10) = MID(10) − 100 and RIGHT(10) = MID(10) − 50

vi. LEFT(10) = MID(10) − 100 and RIGHT(10) = MID(10) + 50

vii. LEFT(10) = MID(10) + 100 and RIGHT(10) = MID(10) − 50

viii. NONE OF THESE

c. [4 points] Which of the following are antiderivatives of $h(x) = e^x \cos x$?

i. $J(x) = \int_1^{e^x} \cos(\ln t)\, dt$

ii. $K(x) = \frac{1}{2}e^x \cos x + \frac{1}{2}e^x \sin x + 4$

iii. $L(x) = \int_0^x e^t \cos t\, dt$

iv. $M(x) = \int_0^{x+2\pi} e^{t-2\pi} \cos t\, dt$

v. NONE OF THESE