Name (Print): _____

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Please clearly organize your work, show all steps, simplify all answers, and $\boxed{\text{BOX}}$ your answers.

1. (5 points) Give the **general** anti-derivative of the following function:

$$f(x) = \frac{1}{2\sqrt{x}} - e^{x/5} + \frac{1}{\sqrt{9 - x^2}}$$

2. (5 points) Suppose $f(x)$ is an even function and $g(x)$ is an odd function. If $\int_{-2}^{2} f(x)\, dx = 5$ and $\int_{-2}^{0} g(x)\, dx = 2$, find $\int_{0}^{2} f(x) - g(x)\, dx$.

3. (10 points) Suppose $f(x) = (x+1)^2$. Use a general Riemann Sum

$$\lim_{n \to \infty} \sum_{k=1}^{n} f(x_k^*) \Delta x$$

to evaluate the definite integral of $f(x)$ on the interval $[-1,3]$, by following these steps:

(a) Find the length of each subinterval Δx in terms of n.

$\Delta x = \boxed{}$

(b) Evaluate x_k^* as the right-hand endpoint of the subinterval.

$x_k^* = \boxed{}$

(c) Evaluate the function at x_k^*, i.e. find $f(x_k^*)$. *Simplify.* $f(x_k^*) = \boxed{}$

(d) Using the following summation formulas to simplify the sigma notation, find an expression for $R_n = \sum_{k=1}^{n} f(x_k^*) \Delta x$ that does not involve sigma's.

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2} \qquad \sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$$

(e) Using the sum you found in the previous step, find the definite integral.