Math 1512 Exam 3 Take Home

NAME:_____

INSTRUCTIONS:

SHOW ALL OF YOUR WORK. Unsupported and illegible answers will not receive credit. Use **proper mathematical notation** to receive full credit. **You are allowed to use a calculator on this test**. However, you cannot consult the internet. May the Force be with you...

1. (23 pts) Consider the function $f(x) = 8 - 2x^2$ on the interval $[0, 4]$

   a. Approximate the net area bounded by the graph of f and x-axis on the interval using a midpoint Riemann sum with $n = 4$.

   b. Approximate the net area bounded by the graph of f and x-axis on the interval using a right Riemann sum with $n = 8$.

c. Write a formula for the right Riemann sum of f on the interval with n subintervals.

d. Using the following formula

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

evaluate the definite integral $\int_0^4 f(x)\ dx$ by taking the limit as $n \to \infty$ of the formula you wrote in part c.

2. (12 pts) A softball is popped up vertically from the ground with a velocity of 30 m/s.

   a. Starting with the equation $a(t) = v'(t) = -9.8$ m/s^2, find the equations for the velocity $v(t)$ and position $s(t)$.

   b. Find the time when the object reaches its highest point. What is the height?