Name: _____ _____ **/ 25**

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [3 points] If $F(x) = \int_3^x t^5 \sin(t+1)\,dt$, find $F'(x)$.

2. [4 points] Let $Q(x) = \int_0^x (t+1)\,dt$.

a. Find $Q(2)$.

b. Find $Q'(2)$.

3. [4 points] Evaluate the definite integral $\int_{-2}^{2} \left(x^3 + 3x^2 - 5x\right)\,dx$. Your answer should be in the form of a simplified number.

4. [6 points] Assume height of balloon is changing at rate of $r(t) = t - 2\cos(t)$ where t is measured in minutes and $r(t)$ is measured in feet per minute starting at time $t = 0$.

a. Evaluate $\int_0^{\pi} r(t)\,dt$

b. Interpret the meaning of the calculation from part (a). Include units in your answer.

5. [8 points] Use the method of substitution to evaluate the integrals below.

a. $\int x^2(5-x^3)^8 dx$

b. $\int \theta^{-2}\cos(\theta^{-1})\,d\theta$