PRINT Your Name:_____

Quiz 7 — October 2, 2009 – 9:05 section

Remove everything from your desk except this page and a pencil or pen.

Circle your answer. **Show your work.**
The quiz is worth 5 points.

Compute $\displaystyle\int \frac{dx}{\sqrt{3+2x-x^2}}$.

Answer: Complete the square: $3+2x-x^2 = 3-(x^2-2x+\boxed{1})+\boxed{1} = 4-(x-1)^2$.
So the integral is

$$\int \frac{dx}{\sqrt{4-(x-1)^2}}.$$

Let $x-1 = 2\sin\theta$ It follows that $dx = 2\cos\theta d\theta$. One computes

$$4-(x-1)^2 = 4-4\sin^2\theta = 4\cos^2\theta.$$

The integral is

$$\int \frac{2\cos\theta d\theta}{2\cos\theta} = \int d\theta = \theta + C = \boxed{\arcsin\left(\frac{x-1}{2}\right)+C}.$$

Check. The derivative of the proposed answer is

$$\frac{1/2}{\sqrt{1-(x-1)^2/4}} = \frac{1/2}{\sqrt{\frac{4-(x^2-2x+1)}{4}}} = \frac{1}{\sqrt{3+2x-x^2}}. \checkmark$$