PRINT Your Name:____________________

Quiz 4 — September 11, 2009 – 9:05 section

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

$\boxed{\text{Circle}}$ your answer. **Show your work.**
The quiz is worth 5 points.

Find a positive value of k such that the average value of $f(x) = \sqrt{3x}$ over the interval $[0, k]$ is 6.

Answer: We know that the average of $f(x)$ on $[a, b]$ is $\frac{1}{b-a}\int_a^b f(x)dx$. We want k so that the average value of $f(x) = \sqrt{3x}$ over the interval $[0, k]$ is 6. In other words, we want k with

$$6 = \frac{1}{k-0}\int_0^k \sqrt{3x}dx$$

$$6 = \frac{1}{k}\int_0^k \sqrt{3}x^{1/2}dx$$

$$6 = \frac{1}{k}\sqrt{3}x^{3/2}2/3\Big|_0^k$$

$$6 = \frac{1}{k}\sqrt{3}k^{3/2}2/3$$

$$6(3/2) = \sqrt{3}k^{1/2}$$

$$9 = \sqrt{3}k^{1/2}$$

$$81 = 3k$$

$$\boxed{27} = k.$$