SM 223$_{\text{TSM}}$ Quiz #16 22 Nov 2010 Last Name SOLUTIONS Section ○4041 ○5041 ○6041

Time Limit: 5 minutes

Instructions: Open notes. Closed book. No calculator allowed.

Instructions for all quizzes: **Do not discuss any aspect of this quiz with other midshipmen until after 6th period.**

Print your last name above. Also, fill in the bubble for your section.

Fill the bubble for the correct answer. Also, write your answers in any blanks provided.

Your work will not be graded unless the instructions request you show your work.

Throughout this quiz we consider the function

$$f(x,y) = x^2 y$$

and the rectangle

$$R = \{(x,y) \big| \ 0 \le x \le 3, \ 1 \le y \le 2\}.$$

1. Evaluate the double integral

$$\int\int_R f(x,y)\,dA$$ PUT YOUR WORK BELOW

○ 27 ○ 9 ○ 7/2 ○ 7/3 ● none of above; correct is 27/2

$$\int\int_R f(x,y)\,dA = \int_0^3 \int_1^2 x^2 y\,dy\,dx = \frac{1}{2}\int_0^3 x^2 y^2 \Big|_{y=1}^{y=2} dx$$

$$= \frac{1}{2}\int_0^3 x^2\left(2^2 - 1^2\right)\,dx = \frac{3}{2}\int_0^3 x^2\,dx = \frac{3}{2}\,\frac{x^3}{3}\Big|_{x=0}^{x=3} = \frac{1}{2}\left(3^3 - 0^3\right) = \frac{27}{2}.$$

2. Find the average value of f over R.

○ 27/4 ● 9/2 ○ 7/2 ○ 9/4 ○ none of above; correct is _____

$$\text{Average value of } f \text{ over } R = \frac{1}{\text{Area of } R}\int\int_R f(x,y)\,dA$$

$$= \frac{1}{(3-0)(2-1)}\left(\frac{27}{2}\right) = \frac{9}{2}$$