

Remember to always show all supporting work.

1. (5 points) (See WeBWorK 4.2 #3) For this problem, refer to the function

$$f(x) = \sqrt{x(1-x)}.$$

- (a) (Review.) Determine the *natural* domain of  $f(x)$ . Give a mathematically complete, correct verification of your answer. (Take it up a notch from whatever you did on the 4.1 written homework.)

- (b) Is  $f(x)$  continuous on the interval  $[0, 1]$ ? Why or why not? (It may help to use the fact that, when you compose two continuous functions, you get another continuous function.)

- (c) Is  $f(x)$  differentiable on the open interval  $(0, 1)$ ? Why or why not?

- (d) Does  $f(x)$  satisfy the hypotheses of the Mean Value Theorem on the interval  $[0, 1]$ ? Why or why not?

2. (5 points) (See WeBWorK 4.3 #8) For this problem, refer to the function  $g(x) = x\sqrt{9 - x^2}$ .

(a) (Review.) Determine the domain of  $g(x)$ . Give a mathematically complete, correct verification of your answer. (Take it up a notch from whatever you did on the 4.1 written homework.)

(b) Determine the critical numbers of  $g(x)$ . Be sure to label each critical number with its type.

(c) Determine intervals where  $g(x)$  is increasing/decreasing. Record your information in a chart like the ones we used in class. Show all work clearly.