BC Calculus
Test # 5 (81–90) Review

81. Let R be the region bounded by $y = \sqrt{x}$, x = 4, and the x–axis. Find the volume of the solid formed when R is revolved around the:
    A) x–axis.
    B) y–axis.

82. A) For a function to have a derivative at x = c it is **necessary** that the function be _____ at x = c. This was summarized as _____ _____ _____. Its converse, however, is not true.

    B) Find the values of a and b that make the function $f(x) = \begin{cases} ax^2 + bx, & x \geq 2 \\ -2x + 3, & x < 2 \end{cases}$ everywhere differentiable.

83. A) $\int \cos^2 2x \, dx =$ B) $\int \cos^2 3x \sin^2 3x \, dx =$

84. Find the derivative of each of the following: A) $y = (\cos x)^{\sin x}$

    B) $y = \dfrac{(x-3)^2 \sqrt[3]{x^2+3}}{(x^3-4)^3}$

85. Find the value of c which satisfies the mean value theorem for $y = 2x^3 - x$ on the interval $[-1, 2]$.

86. Suppose that $\int_a^b f(x^2)\,dx = K$ and $\int_0^b f(x^2)\,dx = L$, then what is the value of $\int_0^{-a} f(x^2)\,dx$?

87. Find the volume of the solid formed by revolving the region bounded by x = 1, x = 3, y = 0, and $y = x^2 + 2$ around the y axis.

88. A) Find the general solution of $\dfrac{dy}{dx} = 3x^4 y$.

    B) On January 1, 1983 the population of Growthville was 450. By January 1, 1993 the population had grown to 1600. The census department determined that the population of the town was growing at a rate proportional to the current population. If that growth rate continued, what was the population of Growthville on January 1, 2000, and when will the population be 3000?

89. A) Find the average value of y = sin x on the interval $[0, 3\pi/2]$.

    B) Find the value of c which satisfies the mean value theorem for integrals for the function defined in problem number 85.

90. A) The position of a particle moving along the x axis is given by $x(t) = t^2 - 4t - 16$. What is the distance traveled by the particle between t = 0, and t = 5?

    B) The velocity of a particle moving along the x axis is given by $v(t) = t^2 - 4t + 3$. What is the distance traveled by the particle between t = 0, and t = 5?