



AP[®] Calculus AB 2003 Sample Student Responses Form B

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Work for problem 6(a)

$$f'(x) = x \sqrt{f(x)}$$

$$f(3) = 25$$

$$= x (f(x)^{1/2})$$

$$f'(3) = 3 (f(3)^{1/2}) = 3 \cdot 5 = 15$$

$$f''(x) = (f(x)^{1/2}) + x \left(\frac{1}{2} f(x)^{-1/2} \cdot f'(x) \right)$$

$$f''(3) = (f(3)^{1/2}) + 3 \left(\frac{1}{2} \cdot f(3)^{-1/2} \cdot f'(3) \right)$$

$$= 5 + 3 \left(\frac{1}{2} \cdot \frac{1}{5} \cdot 15 \right)$$

$$= 5 + 3 \left(\frac{3}{2} \right)$$

$$= 5 + \frac{9}{2}$$

$$= \underline{\underline{9 \frac{1}{2}}}$$

Continue problem 6 on page 15.

Work for problem 6(b)

$$f(3) = 25$$

$$\frac{dy}{dx} = xy^{1/2}$$

$$\int y^{-1/2} dy = \int x dx$$

$$2y^{1/2} = \frac{1}{2}x^2 + B \quad x=3, y=25$$

$$2.5 = \frac{1}{2}(9) + B$$

$$B = 10 - 4\frac{1}{2} = 5\frac{1}{2} = \frac{11}{2}$$

$$2y^{1/2} = \frac{1}{2}x^2 + \frac{11}{2}$$

simplified $y^{1/2} = \frac{1}{4}x^2 + \frac{11}{4}$

$$\therefore y = \left(\frac{1}{4}x^2 + \frac{11}{4}\right)^2$$

END OF EXAMINATION

THE FOLLOWING INSTRUCTIONS APPLY TO THE BACK COVER OF THIS SECTION II BOOKLET.

- MAKE SURE YOU HAVE COMPLETED THE IDENTIFICATION INFORMATION AS REQUESTED ON THE BACK OF THIS SECTION II BOOKLET.
- CHECK TO SEE THAT YOUR AP NUMBER APPEARS IN THE BOX(ES) ON THE BACK COVER.
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Work for problem 6(a)

$$f(3) = 25$$

$$(3, 25)$$

$$f'(x) = 3\sqrt{25}$$

$$f'(x) = 3 \cdot 5 = 15$$

$$f''(x) = x \cdot \frac{1}{2} (f(x))^{-1/2} \cdot f'(x) + \sqrt{f(x)} \cdot 1$$

$$f''(3) = 3 \cdot \frac{15}{2\sqrt{25}} + \sqrt{25}$$

$$= 3 \cdot \frac{15}{2 \cdot 5} + 5$$

$$= \frac{9}{2} + \frac{10}{2} = \boxed{\frac{19}{2}}$$

Continue problem 6 on page 15.

Work for problem 6(b)

$$\int \frac{dy}{\sqrt{y}} = \int x dx$$

$$y^{-1/2} = x^2 + C$$

$$2\sqrt{25} = 3^2 + C$$

$$2 \cdot 5 = 9 + C$$

$$10 = 9 + C$$

$$-9 \quad -9$$

$$C = 1$$

$$25 = 3x + 1$$

$$-1$$

$$x = 8$$

$$y = 8x + 1$$

END OF EXAMINATION

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