AP® Calculus AB
2001 Sample Student Responses

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5 5 5 5 5 5 5 5 5 5

NO CALCULATOR ALLOWED

A_1

Work for problem 5(a)

$f(x) = 4x^3 + ax^2 + bx + k$

$f'(x) = 12x^2 + 2ax + b$

$f''(x) = 24x + 2a$

$f''(-2) = 24(-2) + 2a = 0 \rightarrow a = 24$

$f'(-1) = 12(-1)^2 + 2(24)(-1) + b = 0 \rightarrow b = 36$

$12 - 48$

5 5 5 5 5 5 5 5 5 5

NO CALCULATOR ALLOWED

A_2

Work for problem 5(b)

$$\int_0^1 4x^3 + 24x^2 + 36x + k \, dx = 32$$

$$x^4 + 8x^3 + 18x^2 + kx \Big|_0^1 = 32$$

$$1 + 8 + 18 + k = 32$$

$$k = 5$$

NO CALCULATOR ALLOWED

Work for problem 5(a)

C_1

$$f'(x) = 12x^2 + 2ax + b = 0$$

$$12(-1)^2 + 2a(-1) + b = 0$$

$$12 - 2a + b = 0$$

$$f''(x) = 24x + 2a = 0$$

$$24(-1) + 2a = 0$$

$$-24 + 2a = 0$$

$$a = 12$$

$$b = -12$$

5 5 5 5 5 5 5 5 5 5

NO CALCULATOR ALLOWED

Work for problem 5(b)

C_2

$$\int_0^1 4x^3 + 12x^2 - 12x + k = 32$$

$$\left[\frac{4x^4}{4} + \frac{12x^3}{3} - \frac{12x^2}{2} + kx\right]_0^1 = 32$$

$$\left[x^4 + 4x^3 - 6x^2 + kx\right]_0^1 = 32$$

$$1 + 4 - 6 + 1k = 32$$

$$-1 + 1k = 32$$

$$\boxed{k = 33}$$