AP Calculus

Multiple Choice Monday #2

Name: Key

Date: ______________ Per: ____

Problem | **Section Name**

1. If $y = \ln(6x^3 - 2x^2)$, then $f'(x) =$

(A) $\frac{9x+2}{3x^2-x}$ (B) $\frac{9x+2}{3x^2+x}$ [✓ (C)] $\frac{9x-2}{3x^2-x}$ (D) $\frac{9x-2}{3x^2+x}$ (E) $\frac{18x^2+4x}{6x^3-2x^2}$

$u = 6x^3 - 2x^2$

$du = 18x^2 - 4x$

$$y' = \frac{18x^2 - 4x}{6x^3 - 2x^2} = \frac{2x(9x-2)}{2x(3x^2-x)} = \frac{9x-2}{3x^2-x}$$

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2. $\int \frac{x^3}{2} dx =$

[✓ (A)] $\frac{x^4}{8} + C$ (B) $\frac{x^4}{2} + C$ (C) $2x^4 + C$ (D) $\frac{3}{2}x^2 + C$ (E) $8x^4 + C$

$$\frac{1}{2}\int x^3 dx$$

$$\frac{1}{2}\frac{x^4}{4} + C = \frac{x^4}{8} + C$$

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3. The figure below shows a slope field for one the differential equations given below. Identify the equation.

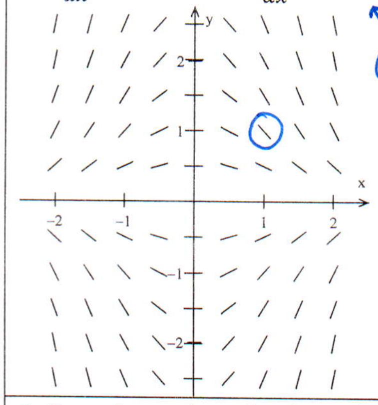
(A) $\frac{dy}{dx} = y - x$ [✓ (B)] $\frac{dy}{dx} = -xy$ (C) $\frac{dy}{dx} = 2x$ (D) $\frac{dy}{dx} = \frac{x}{y}$ (E) $\frac{dy}{dx} = -2y$

(A): $(1,1) \rightarrow 0$

(B): $(1,1) \rightarrow -1$

(D): $(1,1) \rightarrow +1$

(C), (E): only changes just x or just y



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4. For what value of x does the function $f(x) = x^3 - 9x^2 - 120x + 6$ have a local minimum?

[✓ (A)] 10 (B) 4 (C) 3 (D) −4 (E) −10

$f'(x) = 3x^2 - 18x - 120$

$0 = 3(x^2 - 6x - 40)$

$0 = 3(x-10)(x+4)$

$x = 10, -4$

f	inc	dec	inc
f'	+	−	+
		−4	$\boxed{10}$

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$v(0)=10$ $s(0)=4$

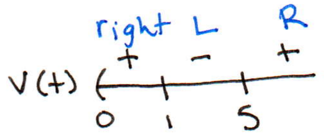
5. The acceleration of a particle moving along the $x-axis$ at time t is given by $a(t) = 4t - 12$. If the velocity is 10 when $t = 0$ and the position is 4 when $t = 0$, then the particle is changing directions at

(A) $t = 1$ (B) $t = 3$ (C) $t = 5$ [✓ (D) $t = 1$ and $t = 5$] (E) $t = 1$ and $t = 3$ and $t = 5$

$v(t) = 0$

$$v(t) = \int_0^t 4x - 12\,dx$$
$$= 2t^2 - 12t + v(0)$$
$$= 2t^2 - 12t + 10$$

$$0 = 2(t^2 - 6t + 5)$$
$$0 = 2(t-5)(t-1)$$
$$t = 1, 5$$



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6. Where does the curve $y = 5 - (x-2)^{2/3}$ have a cusp?

(A) (0,5) (B) (5,2) [✓ (C) (2,5)] (D) (5,0) (E) There is no cusp

Cusp = no derivative exists

$$y' = -\frac{2}{3}(x-2)^{-1/3}\cdot(1)$$
$$= \frac{-2}{3(x-2)^{1/2}} \swarrow\ y' \text{ DNE @ } x=2$$

$$y(2) = 5 - (2-2)^{2/3}$$
$$= 5 - 0$$
$$= 5$$

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*7. Find the equation of the line tangent to the graph $y = 2x - 3x^{-2/3} + 5$ at $x = 8$

[✓ (A) $y = \frac{33}{16}x + \frac{15}{4}$] (B) $y = \frac{15}{4}x + \frac{33}{16}$ (C) $y = \frac{16}{33}x + \frac{4}{15}$ (D) $y = \frac{16}{33}x + \frac{15}{4}$ (E) $y = \frac{33}{16}x + \frac{4}{15}$

$$y = m(x-8) + y_1$$

↑ plug into calc + calc will simplify for you

Calc $f1(x) := 2x - 3x^{-2/3} + 5$

$f1(8) =$

$\frac{d}{dx}(f1(x))|x=8$

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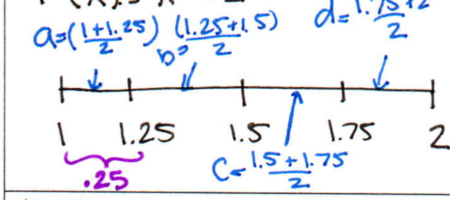
*8. Approximate the area under the curve $y = x^2 + 2$ from $x = 1$ to $x = 2$ using four midpoint rectangles.

(A) 4.333 (B) 3.969 (C) 4.719 (D) 4.344 [✓ (E) 4.328]

$f1(x) := x^2 + 2$



base · height

$(.25)\cdot f1(a)$
$(.25)\cdot f1(b)$
$(.25)\cdot f1(c)$
$(.25)\cdot f1(d)$

} sum

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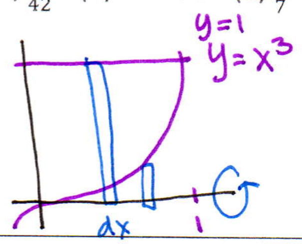
*9. The volume generated by revolving about the $x-axis$ the region above the curve $y = x^3$ and below the line $y = 1$, and between $x = 0$ and $x = 1$ is

(A) $\frac{\pi}{42}$ (B) 0.143π (C) $\frac{\pi}{7}$ (D) 0.643π [✓ (E) $\frac{6\pi}{7}$]



washer $\pi\int_0^1 (0-1)^2 - (0-x^3)^2\,dx$

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