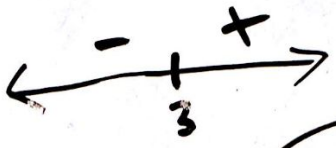
12

2002 FRQ 5a.

$y = 3 - x = 0$

$-1x = -3$

$x = 3$



$y = \frac{3-x}{-1}$

Local minimum at $x = 3$ because at $x = 3$, slope of graph changes from negative to positive.

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2002 #5b

$g(6) = -4$

$$\frac{dy}{dx} = \frac{3-x}{y} \rightarrow y\,dy = (3-x)\,dx$$

$$\int y\,dy = \int (3-x)\,dx \qquad \frac{y^2}{2} = 3x - \frac{1}{2}x^2 + C$$

$$\frac{(-4)^2}{2} = 3(6) - \frac{1}{2}(6)^2 + C$$

$$8 = 18 - 18 + C \qquad C = 8$$

$$\frac{y^2}{2} = 3x - \frac{1}{2}x^2 + 8$$

$$y^2 = 2\left(3x - \frac{1}{2}x^2 + 8\right)$$

$$y = -\sqrt{2\left(3x - \frac{1}{2}x^2 + 8\right)}$$

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2003 BC MC 5)

x	y	$\frac{dy}{dx}$	
1	2	3	
1.5	3.5	5	$y = 3(.5) + 2$ $= 3.5$
2	6	8	$y = 5(.5) + 3.5$ $= 6$

$f(2) = 6 \rightarrow$ C

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2008 BC MC#7

$y(1) = -3$ $\quad \frac{dy}{dx} = 2x + y$ $\quad$ approx. $y(2) = ?$

step size = 0.5

x	y	dy/dx
1	-3	-1
1.5	-3.5	-0.5
2	-3.75	

$y_1 = -1(0.5) + -3$
$\hookrightarrow -3.5$

$y_2 = -0.5(0.5) + -3.5$
$\hookrightarrow -3.75$

(D)

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$y = 1000e^{.026(12)}$

X	Y	f'(x)
1	4	-12
1.5	-2	9
2	2.5	

$f(1) = 4$

$f'(x) = -3x \cdot f(x)$

$f'(x) = -3(1) \cdot 4$

$f'(x) = -12$

$y = -12(0.5) + 4$

$y = -2$

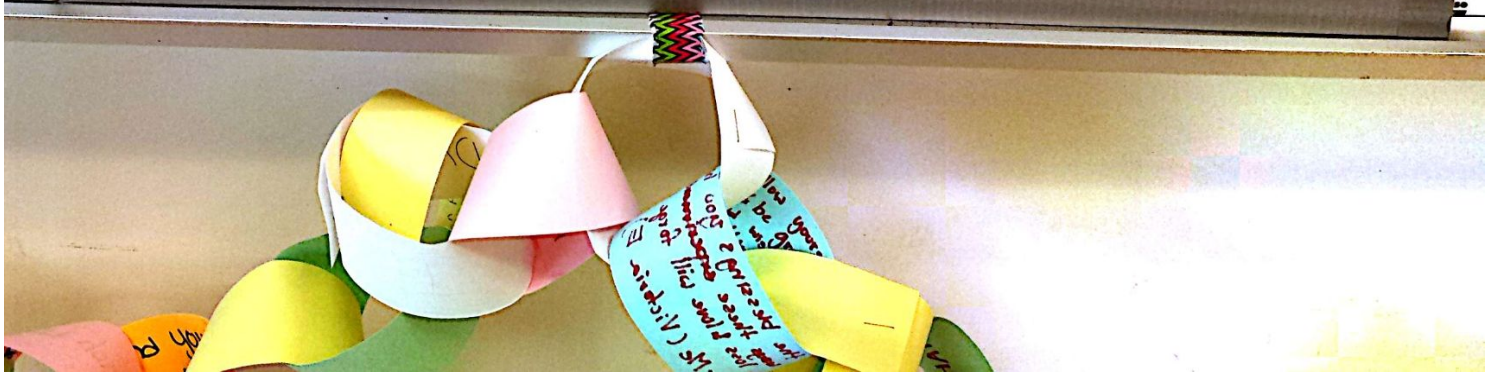
$f'(x) = -3(1.5) \cdot (-2)$

$= 9$

$y = 9(.5) - 2 = 2.5$

$\boxed{f(2) \approx 2.5}$

2001 BC FRQ Part B



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A

2007 Form B BC Part C

x	y	$\frac{dy}{dx}$
0	-2	-3
.5	-3.5	-4.5
1	-5.75	

$y = -3(.5) - 2$

$f(.5) = -3.5$

$y = -4.5(.5) - 3.5$

$\boxed{f(1) = -5.75}$

$\frac{dy}{dx} = 3x + 2y + 1$

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x	y	$\frac{dy}{dx}$
0	k	5
1	0	

$\frac{dy}{dx} = 3x + 2y + 1$

$5 = 3(0) + 2k + 1$

$5 = 2k + 1$

$y = 5(1) + k$

$0 = 2k + 1 + k$

$0 = 3k + 1$

$-1 = 3k$

$k = -\frac{1}{3}$

2007
BC5 Form B
Part d

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2003 BC MC #21

$\frac{dM}{dt} = 0.6M\left(1 - \frac{M}{200}\right)$ t = time in years $M(0) = 50$

$\lim_{t \to \infty} M(t) = 200$ carrying capacity

$\frac{dM}{dt} = KM\left(1 - \frac{M}{A}\right)$ A = carrying capacity

$A = 200$

(B)

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2008 BC MC #24

$KP(M-P)$

$KP(200-P)$

$K(200P-P^2)$

$\downarrow$

$\frac{dP}{dt} = .001(200P-P^2)$

(A)

$= .2P - .001P^2$

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