AP Calculus AB/BC #1 Key 2026

1A) $M'(7.5) = \dfrac{M(10)-M(5)}{10-5} = \dfrac{16-7}{10-5} = \underline{\underline{\dfrac{9}{5}}}\ \dfrac{\text{birds}/\text{day}}{\text{day}}$

1Bi) $\int_0^{30} M(t)\,dt = 7(10-0) + 6(20-10) + 2(30-20)$
$= 7(10) + 6(10) + 2(10)$
$= 70 + 60 + 20$
$= 150$ male birds

1Bii) $\int_0^{30} M(t)\,dt$ represents the number of male birds that arrive at the nesting area over a thirty-day period.

1C) $\int_{15}^{45} 18 + 16\sin\left[\frac{\pi}{20}(t+15)\right] = 641.859 \approx \underline{\underline{642}}$ female birds

1D) $D(t) = M(t) - F(t)$, $D(t)$ is differentiable and therefore continuous. $D(15) = 4$ and $D(20) \approx -1.686$
Since $D(20) < 0 < D(15)$
by IVT guarantees at least one value of t in $(15, 20)$ where $D(t) = 0$

AP Calculus BC #2 Key 2026

A) $A = \frac{1}{2}\int_0^{\pi}(3+2\sin 2\theta+\cos 2\theta)^2\,d\theta$

$A = \frac{23\pi}{4} \approx 18.064$

B) $-\frac{3}{7} = \frac{\frac{3\sqrt{2}}{2}}{\frac{dx}{d\theta}} \Rightarrow \frac{dx}{d\theta} = \frac{3\sqrt{2}}{2}\left(-\frac{7}{3}\right) = \underline{\underline{-\frac{7\sqrt{2}}{2}}}$

Ci) $4\cos(2\theta) - 2\sin(2\theta) = 0$

$4\cos 2\theta = 2\sin(2\theta)$

$2 = \tan(2\theta)$

$\theta = \frac{\tan^{-1}(2)}{2} \approx \underline{\underline{0.55357}}$

Cii) $r'(0.5) \approx 0.477$ $r'(0.6) \approx -0.41$

Since $r'(\theta)$ changes from positive to negative at $\theta \approx 0.554$, r has a relative maximum at this point.

D) $\text{Avg} = \frac{2}{\pi}\int_{\pi/2}^{\pi} r(\theta)\,d\theta$

$\approx \underline{\underline{1.7267}}$

AP Calculus AB/BC #3

2026

A) Since the slope depends on the value of H, for any $H > 20$ the expression $(H-20) > 0$. This would make $\frac{dH}{dt} < 0$. The slope field shows positive slopes for $H > 20$, this can't represent the differential equation.

B) $H(0) = 75$ $\quad \left.\frac{dH}{dt}\right|_{t=0} = -\frac{1}{15}(75-20) = \underline{\underline{-\frac{11}{3}}}$

C) $\frac{d^2H}{dt^2} = \frac{1}{225}(H-20)$, we know for $t > 0$ $20 < H(t) < 75$, so $(H-20) > 0$ and the graph of H is concave up. Therefore, tangent line is an underestimate.

D) $\int \frac{1}{H-20}\, dH = \int -\frac{1}{15} dt$

$\ln|H-20| = -\frac{1}{15}t + C$

$\ln|75-20| = C$

$C = \ln(55)$

$\ln|H-20) = -\frac{1}{15}t + \ln(55)$

$H - 20 = e^{-1/15 t + \ln 55}$

$$\underline{\underline{H(t) = 20 + 55e^{-\frac{t}{15}}}}$$

AP Calculus AB/BC #4 — 2026

A) $g(x) = f(x) - \ln(x)$
$g'(x) = f'(x) - \frac{1}{x} \Rightarrow$

$g'(2) = f'(2) - \frac{1}{2}$
$g'(2) = 1.5 - 0.5$
$\underline{g'(2) = 1}$

B) At $x=1$, a point of inflection occurs where the graph of f' changes from increasing to decreasing or vice versa. Since the graph of f' has a relative maximum at $x=1$, f' changes from inc to dec the graph of f has a point of inflection.

C) f increases when $f'(x) > 0$ and f is concave down when $f'(x)$ decreases
$f'(x) > 0$ on $(-2,3)$ and $(3,4)$
f' decreases on $(-4,-3)$ and $(1,3)$
f is increasing + concave down on $(1,3)$

D) $x = -2$ abs. min
$x = 4$ abs. max

Candidates Test

x	f'	f
-4	$-.5$	dec
-2	0	
3	0	inc
4	5	

AP Calculus BC # 5 Key

2026

A) $\int_1^2 (x-1)^{1/3}dx = \frac{3}{4}(x-1)^{4/3}\Big]_1^2$

$= \frac{3}{4}(1)^{4/3} - \frac{3}{4}(0) = \underline{\underline{\frac{3}{4}}}$

B) $V = \pi\int_1^2 \left(\sqrt[3]{x-1}\right)^2 dx = \pi\int_1^2 (x-1)^{2/3}dx$

C) $P = 1 + 1 + \int_1^2 \sqrt{1+[f'(x)]^2}\,dx$

$\underline{\underline{P = 2 + \int_1^2 \sqrt{1+[f'(x)]^2}\,dx}}$

D) $\lim\limits_{b\to\infty} \int_2^b e^{-2x+4}dx$

$u = -2x+4$

$du = -2\,dx$

$-\frac{1}{2}e^{-2x+4}$

$\lim\limits_{b\to\infty} \left[-\frac{1}{2}e^{-2x+4}\right]_2^b$

$\lim\limits_{b\to\infty} \left[\frac{-1}{2e^{2b-4}} + \frac{1}{2}e^0\right] \Rightarrow 0 + \frac{1}{2} = \underline{\underline{\frac{1}{2}}}$

AP Calculus BC #6 Key

2026

A) $g(x) = \frac{2}{1-\left(-\frac{x}{5}\right)} = \frac{2}{1+\frac{x}{5}}$

$r = -\frac{x}{5}$

$|x| < 5$

$g(3) = \frac{10}{5+3} = \frac{10}{8} = \underline{\underline{\frac{5}{4}}}$

B) $g'(x) = f(x) \approx -\frac{2}{5} + \frac{4}{25}x - \frac{6}{125}x^2 + \frac{8}{625}x^3$

C) By alt. series error bound

$\text{Error} \leq |\text{Term}_3| = \left|\frac{8}{625}x^3\right|$

$\left|\frac{8}{625}\left(\frac{5}{2}\right)^3\right| = \left|\frac{8}{625} \cdot \frac{125}{8}\right| = \frac{125}{625} = \frac{1}{5}$

$\therefore \left|f\left(\frac{5}{2}\right) - \left(-\frac{3}{10}\right)\right| \leq \frac{1}{5}$

Di) $e^x \approx 1 + x + \frac{x^2}{2}$

Dii) $h(x) = 25\left[2 - \frac{2}{5}x + \frac{2}{25}x^2 - \ldots\right] - 2\left[1 + x + \frac{x^2}{2} + \ldots\right]$

$h(x) = (50 - 10x + 2x^2) - (2 + 2x + x^2)$

$\underline{\underline{h(x) = 48 - 12x + x^2}}$