AP Calculus AB/BC #1 Key 2026

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

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

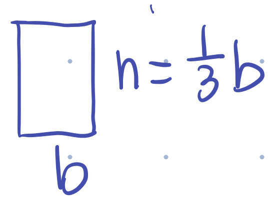
1D) $D(t) = M(t) - F(t)$, $D(t)$ is differentiable and therefore continuous. $D(15) = 4$ and $D(20) \approx -1.686$
Since $D(20) < 0 < D(15)$
by IVT guarantees at least one value of t in $(15, 20)$ where $D(t) = 0$

AP Calculus AB #2

2026

2A) $\int_0^1 g(x)\,dx = \underline{\underline{1.513}}$

2B) $\int_0^1 \frac{1}{3}[g(x)]^2\,dx$



$A = \frac{1}{3}b^2$

2C) $a \approx 3.25581647397$

$$\int_0^1 [f(x) - g(x)]\,dx + \int_1^a [g(x) - f(x)]\,dx$$

$$.25887297 + 0.3729108$$

$$\approx \underline{\underline{0.63178}}$$

2D) $V = \pi \int_1^{3.5} [h(y)]^2\,dy$

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 <u>underestimate</u>.

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

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

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

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

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

$\ln|75-20| = C$

$C = \ln(55)$

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 AB #5

2026

A) $v(t) = t^4 - 8t^3 + 16t^2$

$v(1) = 1 - 8 + 16$

$v(1) = 9$

$a(t) = 4t^3 - 24t^2 + 32t$

$a(1) = 4 - 24 + 32$

$\underline{a(1) = 12}$

B) The car is speeding up at $t=1$ since $v(1) = 9$ and $a(1) = 12$ both positive (same sign)

C) $\int_0^4 (t^4 - 8t^3 + 16t^2)\,dt = \frac{1}{5}t^5 - 2t^4 + \frac{16}{3}t^3 \Big]_0^4$

$\frac{1024}{5} - 2(256) + \frac{16(4)^3}{3} = \underline{\frac{512}{15} \text{ ft}}$

D) Avg Vel. $= \frac{1}{12-6}\int_6^{12} v(t)\,dt$

$= \frac{1}{6}\left[\frac{30}{\pi}\sin\left(\frac{\pi}{3}t\right) - 10t\right]_6^{12}$

$= \frac{1}{6}\left[\left(\frac{30}{\pi}\sin(4\pi) - 120\right) - \left(\frac{30}{\pi}\sin(2\pi) - 60\right)\right]$

$= \frac{1}{6}\left[0 - 120) - (0 - 60)\right]$

$= \frac{1}{6}\left[-60\right] = \underline{-10 \text{ ft/sec}}$

AP Calculus AB #6 2026

A) f is differentiable and continuous

$$\lim_{x\to 2} \frac{f(x)}{x} = \frac{\lim_{x\to 2} f(x)}{\lim_{x\to 2} x} = \frac{3}{2}$$

B) $g(x) = f(f(x))$

$g'(x) = f'(f(x)) \cdot f'(x)$

$g'(2) = f'(f(2)) \cdot f'(2)$

$g'(2) = f'(3) \cdot (4)$

$g'(2) = 9 \cdot 4$

$g'(2) = 36$

c) $h(2) = h(0) + \int_0^2 h'(x)\,dx$

$= 10 + \int_0^2 f'(3x)\,dx$

$h(2) = 10 + \frac{1}{3}\int_0^6 f'(u)\,du$

$h(2) = 10 + \frac{1}{3}[f(6) - f(0)]$

$h(2) = 12$

$u = 3x$

$du = 3\,dx$

$dx = \frac{1}{3}du$

$x=0 \quad u=0$

$x=2 \quad u=6$

Di) $k'(x) = x^2 f(x)$

Dii) $k''(3) = \frac{d}{dx}[x^2 f(x)] \Rightarrow 2x\,f(x) + x^2 f'(x)$

$k''(3) = 2(3)\,f(3) + 3^2 \cdot f'(3)$

$k''(3) = 6(8) + 9(9) = 129$