2013

Answer Key for AP Calculus AB Practice Exam, Section I

Question 76: D

Question 77: E

Question 78: A

Question 79: C

Question 80: E

Question 81: A

Question 82: E

Question 83: B

Question 84: D

Question 85: C

Question 86: E

Question 87: E

Question 88: D

Question 89: E

Question 90: A

Question 91: B

Question 92: A

2013 AB Calculator

(76) $g(x) = \int_0^x f(t)\,dt$

$g(5) = \int_0^5 f(t)\,dt$

$=$ area $\triangle$ + area $\frown$

$= \frac{1}{2}(1)(3) + \frac{\pi(2)^2}{2}$

$\boxed{D}$ $= \frac{3}{2} + 2\pi$

(77) $\frac{dV}{dt} = -3\text{ cm}^3/\text{sec}$

$\frac{dr}{dt} = -.25\text{ cm/sec}$

$r = ?$

$V = \frac{4}{3}\pi r^3$

$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$

$-3 = 4\pi r^2(-.25)$

$-3 = -\pi r^2$

$\sqrt{\frac{3}{\pi}} = \sqrt{r^2}$

$\boxed{E}$ $.977 = r$

(78) $\int_0^3 (f(x)-g(x))\,dx + \int_3^{10}(f(x)-g(x))\,dx = \int_0^{10}(f(x)-g(x))\,dx$

$\int_0^3 (f(x)-g(x))\,dx + 2 = \int_0^{10} f(x)\,dx - \int_0^{10} g(x)\,dx$

$\frac{1}{2}\int_0^{10} g(x)\,dx = 8$

$\int_0^{10} g(x)\,dx = 16$

$\int_0^3 (f(x)-g(x))\,dx + 2 = 21 - 16$

$\int_0^3 f(x)-g(x)\,dx = 3$

$\boxed{A}$

(79) $f'(x)$

f': + on (0, 2), − on (2, 3), + on (3, 4)

f: ↗ ↘ ↗

so, C or D

$f''(x) \to$ slope of f'

f'': + before 1, − on (1, 2.5), + on (2.5, 3.5), − after 3.5

f: ∪ ∩ ∪ ∩

so $\boxed{C}$

(80) Total distance $= \int_a^b |v(t)|\,dt$

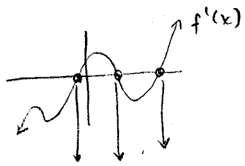
$\boxed{E}$ $= \int_0^5 |s'(t)|\,dt$

(81) ~~tea~~ temp = initial temp + $\int_0^4$ Rate temp of tea dt

$= 200 + \int_0^4 R(t)\,dt$

$\boxed{A}$ $= 175.165°$ F

(82) $f'(x) = x^3 - 4\sin(x^2) + 1$



f'': − + − +

rel. max @ $x = .542$

$\boxed{E}$

(83) $\int_0^3 f(x)\,dx \Rightarrow$ f inc, so Left underestimate

$0.5(0+4+10+18+28+40)$

$= 50$

Right overestimate

$0.5(4+10+18+28+40+54)$

$= 77$

so, $\boxed{B}$

double check: Mdpt is close

$1(4+18+40)$

$= 62$

TRAP is also close

$= \frac{1}{2}(0.5)(0+2(4+10+18+28+40)+54)$

$= 63.5$

(84) $f(a) = 1$, A is FALSE

$f(a) = 1$, $\lim_{x\to a} f(x) = 2$ } $\neq$, B is FALSE

$\lim_{x\to a} f(x) = 2$, C is FALSE

$\lim_{x\to a} f(x) = 2$, D is TRUE $\boxed{D}$ ✓

$\lim_{x\to a} f(x) = 2$, E is FALSE

(85) $x(t) = \cos\sqrt{t}$ position @ origin $x(t) = 0$

$0 = \cos\sqrt{t}$

$2.467 = t$

$x'(2.467) = v(2.467)$

$= -.318$

$\boxed{C}$

(86) $f'(x) > 0 \to f$ inc

so C, D, or E

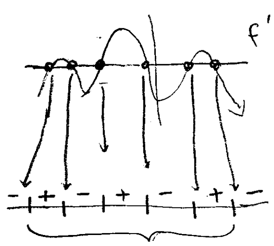
$f''(x) < 0 \to f$ conc. down

C is linear $\to$ not conc. down

D $\to$ $\frac{f(0)-f(-1)}{0--1} = \frac{5-4}{1} = 1$, $\frac{f(1)-f(0)}{1-0} = \frac{7-5}{1} = 2$ } f' inc, so f conc. up

$\therefore \boxed{E}$ $\to$ $\frac{f(0)-f(-1)}{0--1} = \frac{6-4}{1} = 2$, $\frac{f(1)-f(0)}{1-0} = \frac{7-6}{1} = 1$ } f' dec, f conc. down

(87) rel. extrema $\to f'$ goes neg to pos or pos to neg.



− + − + − + −

6 times $\boxed{E}$

(88) $f' \to$ slopes of f

f': − before −1, + on (−1, 0.5), − on (0.5, 1), − after 1

$f'(-1) = 0$

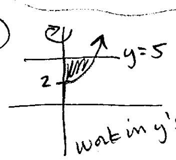
$f'(0) > 0$

$f'(1) < 0$

$f'(1) < f'(-1) < f'(0)$

$\boxed{D}$

(89)



$x = \sqrt{y-2}$

$x^2 = y-2$

$x^2+2 = y$

work in y's

DISK

$V = \pi\int_2^5 (\sqrt{y-2})^2\,dy$

$\boxed{E}$ $= 14.137$

(90) $\frac{dP}{dt} = kP$

$(0, A)$ A starting Population

$(12, 2A)$ double starting Pop

$\int \frac{1}{P}\,dP = \int k\,dt$

$\ln|P| = kt + C$

$\ln|A| = k(0) + C$

$\ln|A| = C$

$\ln|P| = kt + \ln|A|$

$\ln|2A| = k(12) + \ln|A|$

$\ln 2A - \ln A = 12k$

$\ln\left|\frac{2A}{A}\right| = 12k$

$\frac{1}{12}\ln 2 = k \to .058$

$\boxed{A}$

(91) $\int_1^3 x\, f(x^2-1)\, dx$

$u = x^2 - 1$ $\quad u(3) = 8$

$du = 2x\, dx$ $\quad u(1) = 0$

$\frac{du}{2x} = dx$

$\int_0^8 x \cdot f(u) \cdot \frac{du}{2x}$

$= \frac{1}{2} \int_0^8 f(u)\, du$

$= \frac{1}{2}(6)$

$= 3$

$\boxed{B}$

(92) f does not have max value.

If B & D true, then f has vert. asymptote, so f not cont.

C not true, b/c f might still have min.

E not true, b/c $f' = 0$ could be min

so $\boxed{A}$ true