2014

Answer Key for AP Calculus BC Practice Exam, Section I

- Question 76: C
- Question 77: E
- Question 78: C
- Question 79: E
- Question 80: A
- Question 81: D
- Question 82: A
- Question 83: C
- Question 84: B
- Question 85: C
- Question 86: B
- Question 87: B
- Question 88: B
- Question 89: E
- Question 90: E
- Question 91: D
- Question 92: A

$\frac{\text{AB pts}}{12/17}$ = AB subscore pts.

2014 BC Calculator

(76) $f'(?) = \frac{f(5)-f(1)}{5-1}$

u has same slope as $\frac{f(5)-f(1)}{5-1}$

C

(77) $\frac{dP}{dt} = kP(M-P)$

so, $\frac{dy}{dt} = ky(M-y)$

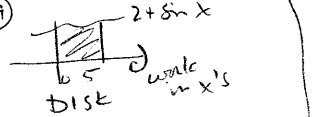
E

(78) $\text{Area} = \int_{-.932}^{.932} \left(\frac{1}{1+x^2} - \left(x^2 - \frac{1}{3}\right)\right) dx$

$= 1.582$

C

(79)



disk

$V = \pi \int_0^5 (2+\sin x)^2 dx$

$= 80.115$

E

(80) $P(x) = f(x)g(x)$

$P'(x) = g(x)f'(x) + f(x)g'(x)$

$P'(-2) = g(-2)f'(-2) + f(-2)g'(-2)$

neg; pos slope for f; $0 \cdot g'(-2)$

$P'(-2) = (\text{neg})(\text{pos}) + 0$

$P'(-2) < 0$

A

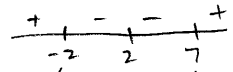
(81) pop @ $t=3$ = initial pop + $\int_0^3$ Rate pop

$= 1500 + \int_0^3 R(t)$

$= 10141$

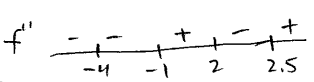
D

(82) f'



rel max @ $x=-2$; rel min @ $x=7$ } so A or B

f'' → slope of f'



3 pts inf, so A

(83) Euler

	$\frac{dy}{dx}$	$\frac{dy}{dx}\Delta x$	$\frac{dy}{dx}\Delta x + y$
(1, 4)	0.2	$0.2(.5) = .1$	$.1 + 4 = 4.1$
(1.5, 4.1)	0.5	$0.5(.5) = .25$	$.25 + 4.1 = 4.35$

C

(84) $\frac{dA}{dt} = 2\text{cm}^2/\text{sec}$

$r = 4\text{cm}$

$\frac{dV}{dt} = ?$

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

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

$\frac{dV}{dt} = 4\pi(4)^2\left(\frac{1}{4\pi}\right)$

$\frac{dV}{dt} = 16$

B

$A = \pi r^2$

$\frac{dA}{dt} = 2\pi r \frac{dr}{dt}$

$2 = 2\pi(4)\frac{dr}{dt}$

$2 = 8\pi \frac{dr}{dt}$

$\frac{1}{4\pi} = \frac{dr}{dt}$

(85) $y = 4x + 3$

$\frac{dy}{dx} = 4$

$\frac{dy/dt}{dx/dt} = \frac{ke^{kt}}{\frac{1}{1+t}}$

$4 = \frac{ke^{k(2)}}{\frac{1}{1+2}}$ numerical solve

C

$k = .495$

(86) $v(t) = s'(t)$

s(t) inc → s' > 0

s(t) conc up → s' inc

$v(t)|_{t=3} \approx \frac{s(4)-s(2)}{4-2} \approx \frac{150-55}{2} = 47.5$

$\approx \frac{s(3)-s(2)}{3-2} = \frac{92-55}{1} = 37$

$\approx \frac{s(4)-s(3)}{4-3} = \frac{150-92}{1} = 58$

B

(87) direct comparison test

B $\sum_{n=1}^{\infty} a_n$ converges (larger series converges),

so $\sum_{n=1}^{\infty} b_n$ converges ∴, $\lim_{n\to\infty} b_n = 0$

(88) velocity = initial velocity + $\int_0^x a(t)\,dt$

$= -\frac{1}{2} + \int_0^x a(t)\,dt$

$\approx .5$ when $t = .5$ b/c area □ $(.5)(1)$

∴, $v = 0$ @ $t = .5$

B

(89) avg rate change $= \frac{f(b)-f(a)}{b-a}$

$= \frac{f(3)-f(0)}{3-0}$

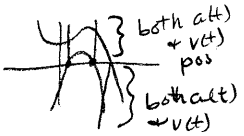
$= \frac{\int_1^3 \sqrt{t^3+2}\,dt - \int_1^0 \sqrt{t^3+2}\,dt}{3}$

$= 2.694$

E

(90) speed inc → v(t) & a(t) same signs

graph v(t) & v'(t)



$(0.177, 1.256) \cup (2.057, \infty)$

a(t) & v(t) both pos. | a(t) & v(t) both neg.

E

(91) $y - y_1 = m(x - x_1)$

$y - \cos k = -\sin k(x - k)$

$0 - \cos k = -\sin k(0 - k)$

$-\cos k = k \sin k$

$k = 2.798$

D

$y = \cos x$

$y' = -\sin x$

$y'(k) = -\sin k$

pass thru origin → (0,0)

graph & intersection or numerical solve

(92) $\int_2^4 f(x)\,g''(x)\,dx$

$\int uv - \int v\,du$ ... ☺ $u = f(x)$ $\int dx = \int g''(x)\,dx$

$du = f'(x)\,dx$ $v = g'(x)$

$= f(x)g'(x)\Big|_2^4 - \int_2^4 g'(x)f'(x)\,dx$ $f'(x) = 3\ \forall x$

$= f(4)g'(4) - f(2)g'(2) - 3\int_2^4 g'(x)\,dx$

$= 13(7) - 7(1) - 3 \cdot g(x)\Big|_2^4$

$= 84 - 3(g(4) - g(2))$ → $= 84 - 3(9-2)$

$= 84 - 21 = 63$

A