2013

Answer Key for AP Calculus BC Practice Exam, Section I

Question 76: A

Question 77: C

Question 78: B

Question 79: C

Question 80: E

Question 81: A

Question 82: C

Question 83: B

Question 84: C

Question 85: C

Question 86: E

Question 87: B

Question 88: B

Question 89: E

Question 90: D

Question 91: E

Question 92: B

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

2013 BC Calculator

(76) $f'(x)$ changes from pos to neg when $f(x)$ has rel max

$x = -3.623$ only

A

(77) cont $\rightarrow \lim_{x\to a^-} f(x) = \lim_{x\to a^+} f(x)$

and $\lim_{x\to a} f(x) = f(a)$

only $a = 1$

C no info about diff'able, so ignore D and E

(78) $\sin(2x) = x$

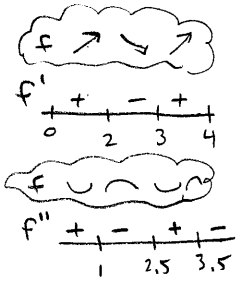
@ $x = .947747$

$\int_0^{.947747} (\sin 2x - x)\,dx$

$= .210399$

B

(79)



C

(80) $\frac{dV}{dt} = ?$ $\frac{dr}{dt} = 6$

$V = \frac{1}{3}\pi r^2(10 - r)$

$V = \frac{1}{3}\pi(10r^2 - r^3)$

$\frac{dV}{dt} = \frac{1}{3}\pi\left(20r\frac{dr}{dt} - 3r^2\frac{dr}{dt}\right)$

$\frac{dV}{dt} = \frac{1}{3}\pi(20r(6) - 3r^2(6))$

$= \frac{1}{3}\pi(120r - 18r^2)$

E $= \pi(40r - 6r^2)$

(81) temp of tea $= 200 + \int_0^4 R(t)\,dt$

$= 175.165$

A $\approx 175°$

(82) $\sum_{n=1}^{\infty} a_n$ converges

if $a_n \geq b_n$, then $\sum_{n=1}^{\infty} b_n$ converges

C

(83)

$\int_0^3 f(x)\,dx$ LRS $= .5(0+4+10+18+28+40)$

$= 50$ underest.

RRS $= .5(4+10+18+28+40+54)$

$= 77$ overest.

MRS $= 1(4+18+40)$

$= 62$ → close

TRAP $= \frac{1}{2}(.5)(0+2(4)+2(10)+2(18)+2(28)+2(40)+54)$

$= 63.5$

B

(84) f concave down when f' dec

C f' dec on $(.116, 2.062)$

(85) $f'(3) = \frac{f(8) - f(-2)}{8 - -2}$

$= \frac{-3-5}{10}$

$= \frac{-8}{10}$

C $= \frac{-4}{5}$

(86) $f' > 0 \rightarrow f$ inc

$f'' < 0 \rightarrow f$ conc down

(c) constant

(d) conc. up

(e) conc. down E

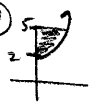
(87) $\frac{y'(2)}{x'(2)} = \frac{5e^{-3(2)} + 2}{2\sin 2}$

B $= 1.10657$

(88) $A = \frac{1}{2}\int_1^{\pi/2} (4\cos\theta)^2\,dx$

B $= .46459$

(89)



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

$= 14.137$ E

(90) I. series alternating

$a_n = \frac{(-1)^n}{\sqrt{n} + (-1)^n}$ ✓

$a_n = (-1)^n\left(\frac{1}{\sqrt{n} + (-1)^n}\right)$

II. $|a_{n+1}| \leq |a_n|$ $\forall n \geq 2$

Let $n = 3$,

$\left|\frac{(-1)^4}{\sqrt{4} + (-1)^4}\right| \overset{?}{\leq} \left|\frac{(-1)^3}{\sqrt{3} + (-1)^3}\right|$

$\frac{1}{3} \leq \left|\frac{-1}{\sqrt{3} - 1}\right|$

$\frac{1}{3} \leq \frac{1}{1.7 - 1}$

$\frac{1}{3} \not\leq \frac{1}{.7}$ not true.

III. $\lim_{n\to\infty} a_n = \lim_{n\to\infty} \frac{(-1)^n}{\sqrt{n} + (-1)^n}$ → $\frac{-1}{\infty + 1} = 0$ ✓

→ $\frac{1}{\infty + 1} = 0$

D I and III only

(91) $v(t) < 0$

$y'(t) < 0 \rightarrow y$ dec on $(3,4) \cup (4,5)$ } ∴ $(4,5)$

$a(t) > 0$

$y''(t) > 0 \rightarrow y$ conc up on $(2,3) \cup (4,5)$

E

(92) $\int x f(x)\,dx$

$u = x$ $\int dv = \int f(x)\,dx$

$du = dx$ $v = -f(x)$

$f'(x) = -f(x)$

$\int f'(x)\,dx = -\int f(x)\,dx$

$-\int f'(x)\,dx = \int f(x)\,dx$

$-f(x) = \int f(x)\,dx$

☺ $\int u\,dv = uv - \int v\,du$

$= x(-f(x)) - \int -f(x)\,dx$

$= -xf(x) + \int f(x)\,dx$

$= -xf(x) + -f(x) + C$

$= -f(x)(x+1) + C$

B