

2015

**Answer Key for AP Calculus BC
Practice Exam, Section I**

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

$$\frac{\text{AB pts}}{13/17} = \text{AB subscore pts}$$

76 $g(-1) = 0 < 3$
 $g(2) = 5 > 3$ } IVT guarantees $g(x) = 3$,
 So need $f(x)$ cont.
B

77 $P'(x) = g(x)f'(x) + f(x)g'(x)$
 $P'(-2) = g(-2)f'(-2) + f(-2)g'(-2)$
 $= -4(+\#) + 0 \cdot 0$
 $P'(-2) < 0$
A

78 oil leaks = $\int_0^{0.5} L(t) dt$
D = 0.541

79 $f(x) = 3 - 4x + \frac{2}{2!}x^2 + \frac{1}{3!}x^3$
 $g(x) = \int f(x) dx$
 $= 3x - 2x^2 + \frac{1}{3}x^3 + \dots$
E

80 abs min @ rel min or endpt.
 f'
 $f(0) = 0$
 $f(2) = \int_0^2 f'(x) dx$
 $= \int_0^1 f'(x) dx + \int_1^2 f'(x) dx$
 $> \int_0^2 f'(x) dx$
E

81
E

82 avg value of f = $\frac{1}{b-a} \int_a^b f(x) dx$
 $= \frac{1}{6-0} \int_0^6 (x+2) \sin \sqrt{x+2} dx$
B = 3.348

83 $\sum_{k=1}^n a_k = \frac{n}{3n+1}$
 $\sum_{k=1}^{\infty} a_k = \lim_{n \rightarrow \infty} \sum_{k=1}^n a_k$
 $= \lim_{n \rightarrow \infty} \frac{n}{3n+1}$ deg N = deg D coefficients
A = $\frac{1}{3}$

$\therefore f(2) < 0$
 abs. min @ $x=2$

85 tangent line \geq graph of function
 $t(x) \geq f(x)$

84
 $\text{Area} = 2 \left(\int_0^5 (2 - \sqrt{\cos(\frac{\pi x}{10})}) dx + 4 \right)$
C = 20.372

$\therefore f'' < 0$
E

86 $\int_0^1 x f''(x) dx$
 $u = x$ $dv = f''(x) dx$
 $du = dx$ $v = f'(x)$
 $= x f'(x) \Big|_0^1 - \int_0^1 f'(x) dx$
 $= 1 \cdot f'(1) - 0 \cdot f'(0) - f(x) \Big|_0^1$
 $= 6 - (f(1) - f(0))$
 $= 6 - (2 - 1)$
 $= 5$
B

87 $f'(-2) = 3$, so C is not true
 f'
 so B not true
 f''
D true

88 $f'(x) = \sin(x^2)$

 rel. min $\rightarrow f'$ neg to pos @ $x = 2.507$
A

90 $f'(c) = \frac{f(b) - f(a)}{b-a}$
 $3 + 8 \sin(2x+1) = \frac{3(2) - 4 \cos(2(2)+1) - (3(1) - 4 \cos(2(-1)+1))}{2 - (-1)}$
 $x = -1.479, x = 1.049$ numerical solve
B

92

x	f(x)	f'(x)	f''(x)
1	3	2	-1
2	3	1	-4
3	4	-3	0
4	1	-3	0
5	-2	-3	0
6	1	-3	0

on (2,3) $f'' < 0$
 on (3,4) $f'' < 0$
D

89 II. $a_n = \frac{(-1)^{n+1}}{n} = (-1)^{n+1} \cdot \frac{1}{n}$
 AST
 $\frac{1}{n} > 0 \checkmark$
 $\frac{1}{n} > \frac{1}{n+1} \checkmark$
 $\lim_{n \rightarrow \infty} \frac{1}{n} = 0 \checkmark$
 III. $a_n = \frac{(-1)^{n+1} n+1}{2n+1}$
 AST
 $\frac{n+1}{2n+1} > 0 \checkmark$
 $\frac{n+1}{2n+1} > \frac{n+2}{2n+3} \checkmark$
 $\lim_{n \rightarrow \infty} \frac{n+1}{2n+1} = \frac{1}{2} \neq 0 \times$
 I. *AST*
 $u_n > 0 \checkmark$
 $u_n > u_{n+1} \times$
 $\frac{1}{q} > 1 \times$
B II only

91 $R=4$
 $H=12$
 $\frac{dV}{dt} = 6 \text{ ft}^3/\text{min}$
 $h=5$
 $\frac{dh}{dt} = ?$
 $V = \frac{1}{3} \pi r^2 h$
 $V = \frac{1}{3} \pi (\frac{1}{3}h)^2 h$
 $V = \frac{1}{3} \pi \cdot \frac{1}{9} h^3$
 $V = \frac{1}{27} \pi h^3$
 $\frac{dV}{dt} = \frac{1}{9} \pi h^2 \frac{dh}{dt}$
 $6 = \frac{1}{9} \pi (5)^2 \frac{dh}{dt}$
 $\frac{1}{3} h = r$
 $6.88 = \frac{dh}{dt}$
B