

2014

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

Question 76: C

Question 77: A

Question 78: A

Question 79: E

Question 80: B

Question 81: D

Question 82: A

Question 83: B

Question 84: A

Question 85: D

Question 86: B

Question 87: C

Question 88: E

Question 89: C

Question 90: E

Question 91: B

Question 92: D

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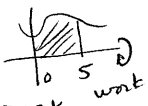
Ques

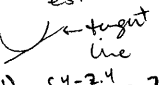
Quest

76) avg velocity $\rightarrow \frac{1}{b-a} \int_a^b v(t) dt$
 $= \frac{1}{8-2} \int_2^8 v(t) dt$
 or
 avg velocity \rightarrow avg rate of change of position
 $= \frac{s(b) - s(a)}{b-a}$
 $= \frac{s(8) - s(2)}{8-2}$
C

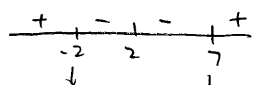
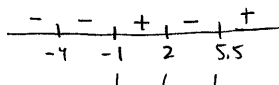
77) $\int_1^2 f(x) dx$
 $= \sin\left(\frac{1}{x^2+1}\right) \Big|_1^2$
 $= \sin\left(\frac{1}{2^2+1}\right) - \sin\left(\frac{1}{1^2+1}\right)$
A = -0.281

78) f inc $\rightarrow f' > 0$, so A, or E
 f pt inf $\rightarrow f'$ changes signs pos to neg or neg to pos. only once.
 $\rightarrow f'$ changes from inc to dec or dec to inc only once
 So **A**

79) 
 DISK with radius 5
 $V = \pi \int_0^5 (2 + \sin x)^2 dx$
 $= 80.115$
E

80) $f''(x) > 0 \rightarrow f$ conc. up, so $f'(3)$ under estimate

 $f'(3) \approx \frac{f(5) - f(1)}{5-1} = \frac{5.4 - 2.4}{4} = 0.75$
 $\approx \frac{f(3) - f(1)}{3-1} = \frac{3.6 - 2.4}{2} = 0.6$
 $\approx \frac{f(5) - f(3)}{5-3} = \frac{5.4 - 3.6}{2} = 0.9$
 So **B**

81) population = initial pop + \int_0^3 (Rate pop)
 $@ t=3$
 $= 1500 + \int_0^3 R(t) dt$
D = 10141

82) f'

 rel max @ $x=-2$ rel min @ $x=7$ } so A or B
 $f'' \rightarrow$ slope of f'
 f'' 
 3 pts of inf. } so **A**

83) $\int_0^3 \frac{1}{2} f(x) - 3g(x) dx = \frac{1}{2} \int_0^3 f(x) dx - 3 \int_0^3 g(x) dx$
 $\int_0^3 f(x) dx + \int_3^6 f(x) dx = \int_0^6 f(x) dx$
 $\int_0^6 f(x) dx + 5 = 9$
 $\int_0^3 f(x) dx = 4$
 $\int_3^6 g(x) dx = 7$
 $\therefore = \frac{1}{2}(4) - 3(7)$
 $= 2 - 21$
B = -19

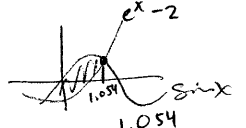
85) total distance = $\int_a^b |v(t)| dt$
 $= \int_0^2 \left| \frac{t^2-1}{t^2+1} \right| dt$
D = 0.927

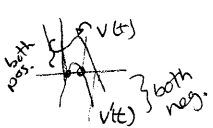
84) avg value = $\frac{1}{b-a} \int_a^b f(x) dx$
 $= \frac{1}{8-0} \int_0^8 f(x) dx$
 $= \frac{1}{8} (A - B + C)$
 $= \frac{1}{8} (14 - 16 + 50)$
A = 6

86) $y - y_1 = m(x - x_1)$
 $y - e^k = e^k(x - k)$
 $\frac{1}{2} - e^k = e^k(0 - k)$
 $\frac{1}{2} - e^k = -ke^k$
 $\frac{1}{2} = -ke^k + e^k$
 $k = 0.768$
 graph intersection or numerical solve
 pt. (k, e^k)
 $y' = e^x$
 $y'(k) = e^k$
 y -int $\rightarrow (0, \frac{1}{2})$

87) $f'(x) \leq 3$ for $[1, 8]$
 I. $f' = \frac{f(5) - f(2)}{5-2} = \frac{6-0}{3} = 2 < 3$
 II. $f' = \frac{f(6) - f(5)}{6-5} = \frac{-2-6}{1} = -8 < 3$
 III. $f' = \frac{f(7) - f(5)}{7-5} = \frac{13-6}{2} = 3.5 > 3$
C I and II only

88) $h(z) = \int_0^z f(t) dt$ area is positive
 $h(z) > 0$
 $h'(z) = \frac{d}{dz} \int_0^z f(t) dt = f(z)$
 $h''(z) = f'(z)$
 $h''(2) = f'(2)$
 $h''(2) < 0 \rightarrow f$ dec @ $x=2$
 $h''(2) < h'(2) < h(z)$
E

89) 
 Area = $\int_0^{1.054} (\sin x - (e^x - 2)) dx$
C = 0.745

90) speed inc $\rightarrow v(t) + a(t)$ same signs
 graph $v(t)$ + graph $v'(t)$

 $(0, 1.77)$ both pos.
 $(1.77, 2.057)$ both neg.
 $(2.057, \infty)$ both neg.
 $a(t) = v'(t)$ both pos.
 $a(t) + v(t)$ both neg.

91) $F'(x) > 0 \rightarrow F$ inc so B, C, or D
 $F''(x) > 0 \rightarrow F$ conc. up or F' inc
 C \rightarrow linear, so not C
 B $\rightarrow \frac{F(2) - F(1)}{2-1} = \frac{-1 - -3}{1} = 2$
 $\frac{F(3) - F(2)}{3-2} = \frac{3 - -1}{1} = 4$
 $\frac{F(4) - F(3)}{4-3} = \frac{19 - 3}{1} = 16$
 F' inc, so $F'' > 0$
B

92) $f(-2) = 4$ $g(4) =$
 $f'(-2) = 4$ $g'(4) = \frac{1}{4}$
 reciprocal
D