2008

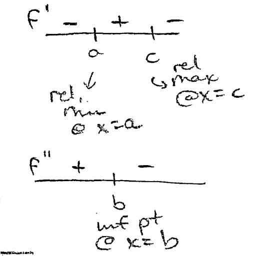
Section I Answer Key and Percent Answering Correctly
Calculus BC

Item No.	Correct Answer	Percent Correct by Grade					Total Percent Correct
		5	4	3	2	1	
*76	D	93	84	72	56	36	77
*77	D	99	98	94	87	69	93
*78	C	94	81	66	49	26	74
79	D	70	45	36	27	21	49
*80	E	70	56	44	33	21	54
*81	B	84	68	56	41	24	65
82	E	93	78	65	51	37	75
*83	B	93	82	71	59	39	77
84	A	95	86	73	54	28	78
*85	C	89	74	62	49	35	71
*86	C	73	42	28	19	13	47
*87	D	91	68	48	31	18	65
*88	A	85	60	43	29	16	59
*89	E	79	55	38	24	14	54
*90	D	91	79	62	44	22	71
*91	D	85	66	47	29	15	61
*92	B	90	73	54	33	18	67

*AB Questions

2008 BC

(76)



$\boxed{D}$

(77) water pumped out $= \int_0^5 R(t)\,dt$

$= 47.193\ m^3$

$\boxed{D}$

(78) $\lim_{x\to c} f(x) = 1$

$\left.\begin{array}{l}\lim_{x\to 0^-} f(x) = \lim_{x\to 0^+} f(x) = 1 \\ \lim_{x\to -2^-} f(x) = \lim_{x\to -2^+} f(x) = 1\end{array}\right\}$ so, −2 and 0 only $\boxed{C}$

$\lim_{x\to 3^-} f(x) = 1$, but $\lim_{x\to 3^+} f(x) = \frac{1}{2}$

(79) If $\sum_{n=1}^{\infty} a_n$ converges and $a_n = f(n)$

then $\int_1^{\infty} f(x)\,dx$ also converges

(integral test)

$\boxed{D}$

(82) $\sum_{n=1}^{\infty} a_n$ diverges and a_n less than b_n,

So by comparison

$\sum_{n=1}^{\infty} b_n$ also diverges $\boxed{E}$

(80) inf pts → f'' changes signs

graph $\frac{d}{dx}(f'(x))$

look @ f'' changing above + below x-axis

5 times $\boxed{E}$

(81) $\int_a^c (f(x) - g(x))\,dx$

$= \int_a^c f(x)\,dx - \int_a^c g(x)\,dx$

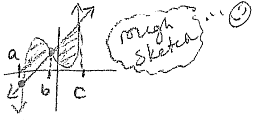
$= \int_a^b f(x)\,dx + \int_b^c f(x)\,dx - \left[\int_a^b g(x)\,dx + \int_b^c g(x)\,dx\right]$

$= P - \int_c^b f(x)\,dx - \left[R - \int_c^b g(x)\,dx\right]$

$= P - Q - [R - S]$

$= P - Q - R + S$ $\boxed{B}$

(83)



$Area = \int_a^b (x^3 - 8x^2 + 18x - 5 - (x+5))\,dx$

$+ \int_b^c (x + 5 - (x^3 - 8x^2 + 18x - 5)\,dx$

$Area = 11.833$ $\boxed{B}$

(84) $Taylor = f(a) + f'(a)(x-a) + \frac{f''(a)}{2!}(x-a)^2 + \frac{f'''(a)}{3!}(x-a)^3$

$= f(3) + f'(3)(x-3) + \frac{f''(3)}{2!}(x-3)^2 + \frac{f'''(3)}{3!}(x-3)^3$

$= 2 - 1(x-3) + \frac{6}{2!}(x-3)^2 + \frac{12}{3!}(x-3)^3$

$\boxed{A}$ $= 2 - (x-3) + 3(x-3)^2 + 2(x-3)^3$

(85) particle change direction when v(t) changes signs

$\boxed{C}$ graph v(t) + see v(t) change from above and below x-axis and vice-versa

(86) $\frac{dy}{dx} = 2x \rightarrow f'(x) = 2x$

$f(3) = 3 + \int_2^3 (2x)\,dx$

$= 3 + (x^2)\Big|_2^3$

$= 3 + 9 - 4$

$= 8$ $\boxed{C}$

(87) $x(3) = 2 + \int_0^3 v(t)\,dt$

$= 2 + \int_0^3 \sqrt[3]{1+t^2}\,dt$

$\boxed{D}$ $= 6.512$

(88) f pos → $f > 0$

f dec → $f' < 0$

$g(x) = \int_2^x f(t)\,dt$

$g'(x) = \frac{d}{dx}\int_2^x f(t)\,dt$

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

so, $g'(x) > 0$

∴, g(x) inc

not C, D, or E

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

so $g''(x) < 0$

∴ slopes of g' dec

(A) $\frac{g(2) - g(1)}{2-1} = \frac{0 - -2}{1} = 2$

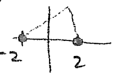
$\frac{g(3) - g(2)}{3-2} = \frac{1-0}{1} = 1$

(B) $\frac{g(2) - g(1)}{2-1} = \frac{0 - -2}{1} = 2$

$\frac{g(3) - g(2)}{3-2} = \frac{3-0}{1} = 3$

$\boxed{A}$

(89) f cont.



$f'(c) \neq 0$

So, no horizontal tangent lines

So at some pt. f' must not exist $\boxed{E}$

(90) $h'(x) = f'(g(x)) \cdot g'(x)$

$h'(2) = f'(g(2)) \cdot g'(2)$

$= f'(-1) \cdot g'(2)$

$= 3 \cdot 2$

$\boxed{D}$ $= 6$

(91) rel. max when f' changes from pos to neg.

$f(x) = \int_{1/3}^{x} \cos\left(\frac{1}{t^2}\right)dt$

$f'(x) = \frac{d}{dx}\int_{1/3}^{x} \cos\left(\frac{1}{t^2}\right)dt$

$f'(x) = \cos\left(\frac{1}{x^2}\right)$

graph f'(x) and see where f'(x) = 0 and changes from above x-axis to below x-axis

$\boxed{D}$ $x = 0.461$

(92)

$B(x) = g(f(x))$

$B'(x) = g'(f(x)) \cdot f'(x)$

$B'(3) = g'(f(3)) \cdot f'(3)$

$= g'(3) \cdot f'(3)$

$= -\frac{1}{2} \cdot \frac{1}{3}$

$\boxed{B}$ $= -\frac{1}{6}$

$g'(3) = \frac{g(3) - g(1)}{3-1} = \frac{-3 - -2}{2} = \frac{-1}{2}$

$f'(3) = \frac{f(3) - f(0)}{3-0} = \frac{3-2}{3} = \frac{1}{3}$