COLEGIO ALMA'S
bilingual school

APELLIDOS Y NOMBRE: Corrección 3er control
CURSO: 2º Bachillerato Nº 1ª Evaluación
FECHA: 21-11-2017 ASIGNATURA: Matemáticas 2

1.- $(1,1) \to f(1)=1$, $f'(1)=0$ $\quad (0,2) \to f(0)=2$, $f''(0)=0$

$f(x)=ax^3+bx^2+cx+d \quad f'(x)=3ax^2+2bx+c \quad f''(x)=6ax+2b$

$$\left.\begin{array}{l} a+b+c+d=1 \\ 3a+2b+c=0 \end{array}\right\} \left.\begin{array}{l} a+c=-1 \\ 3a+c=0 \end{array}\right\} \to 2a=1 \to a=\tfrac{1}{2} \to c=-\tfrac{3}{2}$$

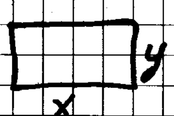
$d=2$

$2b=0 \to b=0$

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

2.- $\left.\begin{array}{l} y'=3x^2+18x-12 \\ y'=9 \end{array}\right\} 3x^2+18x-12=9 \to 3x^2+18x-21=0$

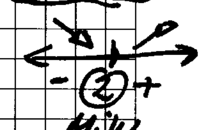
$x^2+6x-7=0 \to \boxed{x=-7}\ \boxed{x=1}$

3.- 

$2x+2y=8 \to x+y=4 \to y=4-x$

$\min\ x^2+y^2=x^2+(4-x)^2=x^2+16-8x+x^2=2x^2-8x+16$

$f(x)=2x^2-8x+16 \quad \mathrm{Dom}\, f(x)=\mathbb{R} \to f'(x)=4x-8=0 \to \boxed{x=2\text{ cm}}\ \boxed{y=2\text{ cm}}$



4.- a) $\displaystyle\int \frac{dx}{\sqrt{x}\cos^2\sqrt{x}}=\int\frac{2\sqrt{x}\,dt}{\sqrt{x}\cos^2 t}=2\int\frac{dt}{\cos^2 t}=2\,\mathrm{tg}\,t+K=\boxed{2\,\mathrm{tg}\sqrt{x}+K}$

$t=\sqrt{x} \to dt=\frac{1}{2\sqrt{x}}dx \to dx=2\sqrt{x}\,dt$

b) $\displaystyle\int\frac{dx}{e^{2x}-3e^x}=\int\frac{dt}{t^2(t-3)}=\int\frac{A}{t}+\frac{B}{t^2}+\frac{C}{t-3}=\boxed{-\frac{1}{9}\ln e^x+\frac{1}{3}\frac{1}{e^x}+\frac{1}{9}\ln|e^x-3|+K}$

$t=e^x \to dt=e^x dx=t\,dx \to \frac{dt}{t}=dx$

$1=At(t-3)+B(t-3)+Ct^2$

$t=0 \to 1=-3B \to B=-\tfrac{1}{3}$

$t=3 \to 1=9C \to C=\tfrac{1}{9}$

$t=1 \to 1=-2A+\tfrac{2}{3}+\tfrac{1}{9}$

$A=-\tfrac{1}{9}$

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c) $\int \frac{x-3}{(x-3)(x-1)}dx = \int \frac{dx}{x-1} = \boxed{\ln|x-1|+K}$

d) $\int\left(\frac{1}{\cos^2 x} - e^x - \frac{2}{x^2}\right)dx = \boxed{\operatorname{tg} x - e^x + \frac{2}{x} + K}$

e) $\int (6x-3)\sqrt{2x^2-2x+3}\,dx = 3\int t^2\,dt = t^3+K = \boxed{\sqrt{(2x^2-2x+3)^3}+K}$

$t^2 = 2x^2-2x+3$

$2t\,dt = (4x-2)\,dx \rightarrow dx = \frac{2t\,dt}{4x-2} = \frac{t\,dt}{2x-1}$

f) $\int 3xe^{2x}dx = \frac{3}{2}xe^{2x} - \frac{3}{2}\int e^{2x}dx = \frac{3}{2}xe^{2x} - \frac{3}{4}e^{2x}+K$

$u = 3x \rightarrow du = 3\,dx$

$dv = e^{2x}dx \rightarrow v = \frac{1}{2}e^{2x}$

$= \boxed{\frac{e^{2x}}{4}(6x-3)+K}$

5.

$f(1) = 1$

$f(1) = -\frac{1}{12}$

$f'(x) = \int (x^2-1)\,dx = \frac{x^3}{3} - x + K_1 \rightarrow \frac{1}{3} - 1 + K_1 = -\frac{1}{12}$

$K_1 = 7/12$

$f(x) = \int\left(\frac{x^3}{3} - x + \frac{7}{12}\right)dx = \frac{x^4}{12} - \frac{x^2}{2} + \frac{7x}{12} + K_2 \rightarrow \frac{1}{12} - \frac{1}{2} + \frac{7}{12} + K_2 = 1$

$K = 5/6$

$\boxed{f(x) = \frac{x^4}{12} - \frac{x^2}{2} + \frac{7x}{12} + \frac{5}{6}}$