Tema 1

1. Sea $f(x) = 2 + \ln(3x+1)$. Hallar la ecuación de la recta tangente al gráfico de f en el punto de abscisa $x = 0$.

2. Sea $f(x) = \dfrac{2x}{x^2+49}$. Hallar los intervalos de crecimiento y de decrecimiento y los máximos y mínimos relativos de f.

3. Calcular $\displaystyle\int x^2(5x^3+5)\,dx$.

4. Hallar el área de la región comprendida entre los gráficos de $f(x) = x^2 + 18$ y $g(x) = 9x$.

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1) $F(x) = 2 + \ln(3x+1)$

$x = 0$

$P(0,2)$

$m = 3$

$F(0) = 2 + \ln(3.0+1)$

$F(0) = 2 + \ln(1) =$

$2 + 0 = \boxed{2}$ ✓

$F(x) = 2 + \ln(3x+1)$

$\boxed{F'(x) = \dfrac{1}{(3x+1)} \cdot 3}$ ✓

$F'(0) = \dfrac{1}{3.(0)+1} \cdot 3$

$F'(0) = \dfrac{1}{1} \cdot 3 = \boxed{\overset{m}{3}}$

$y = mx + b$

$\boxed{R^{ta} = y = 3x + 2}$ ✓

$3.0 + b = 2$

$\boxed{b = 2}$ ✓

2) $f(x) = \dfrac{2x}{x^2+49}$

$\boxed{\text{Dom } f = \mathbb{R}}$

$$f'(x) = \frac{2 \cdot (x^2+49) - 2x \cdot 2x}{(x^2+49)^2}$$

$$f'(x) = \frac{2x^2+98-4x^2}{(x^2+49)^2}$$

$$f'(x) = \frac{-2x^2+98}{(x^2+49)^2}$$

$f'(x) = 0$

$$f'(x) = \frac{-2x^2+98}{(x^2+49)^2}$$

$-2x^2+98 = 0$

$-2x^2 = -98$

$x^2 = \dfrac{-98}{-2}$

$x^2 = 49$

$|x| = \sqrt{49}$

$\boxed{x = 7}$

$\boxed{x = -7}$

	$(-\infty,-7)$	-7	$(-7,7)$	7	$(7,+\infty)$
f'	$f'(-10)=$ −	0	$f'(1)=$ +	0	$f'(10)=$ −
f	$\searrow$	MIN	$\nearrow$	MAX	$\searrow$

$C^{\nearrow} = (-7,7)$

$C^{\searrow} = (-\infty,-7)\ (7,+\infty)$

MAX : $x = 7$

MIN : $x = -7$

$$f'(-10) = \frac{-2(-10)^2+98}{((-10)^2+49)^2} = -$$

$$f'(1) = \frac{-2.1^2+98}{(1^2+49)^2} = +$$

$$f'(10) = \frac{-2.(10)^2+98}{(10^2+49)^2} = -$$

$$\frac{x^{5+1}}{5+1} = \frac{x^6}{6}$$

$$\frac{x^{2+1}}{2+1} = \frac{x^3}{3}$$

3).- $\int x^2 (5x^3 + 5)\, dx$

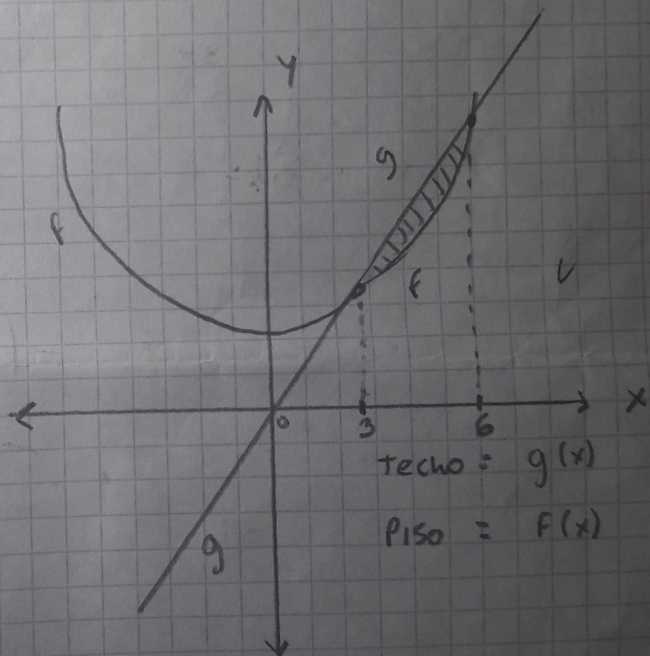
$\int 5x^5 + 5x^2 \, dx$

$5\int x^5 dx + 5\int x^2 dx$

$$\boxed{5\frac{x^6}{6} + 5\frac{x^3}{3} + C}$$ ✓

9).- $f(x) = x^2 + 18$

$g(x) = 9x$



Techo = $g(x)$

Piso = $f(x)$

Intersección

$f(x) = g(x)$

$x^2 + 18 = 9x$

$x^2 + 18 - 9x = 0$

$x^2 - 9x + 18 = 0$

Resolvente

$a = 1$

$b = -9$

$c = 18$

$$x_1, x_2 = \frac{-(-9) \pm \sqrt{(-9)^2 - 4 \cdot 1 \cdot 18}}{2 \cdot 1}$$

$$x_1, x_2 = \frac{9 \pm \sqrt{81 - 72}}{2}$$

$$x_1, x_2 = \frac{9 \pm \sqrt{9}}{2}$$

$$x_1 = \frac{9+3}{2} \qquad x_2 = \frac{9-3}{2}$$

$$x_1 = \frac{12}{2} \qquad x_2 = \frac{6}{2}$$

$$\boxed{x_1 = 6} \qquad \boxed{x_2 = 3}$$

$$\int_3^6 9x - x^2 - 18\,dx = \left[9 \frac{1}{2} x^2 - \frac{1}{3} x^3 - 18x \right]_3^6$$

$$\left(9 \cdot \frac{1}{2} \cdot 6^2 - \frac{1}{3} \cdot 6^3 - 18 \cdot 6 \right) - \left(9 \cdot \frac{1}{2} \cdot 3^2 - \frac{1}{3} \cdot 3^3 - 18 \cdot 3 \right)$$

$$\left(162 - 72 - 108 \right) - \left(40{,}5 - 9 - 54 \right)$$

$$-18 \qquad - \quad (-22{,}5)$$

$$22{,}5 - 18 = 4{,}5$$

$\frac{9x^{1+1}}{1+1} = 9$ …

$\frac{x^{2+1}}{2+1} = \frac{x}{3}$ …