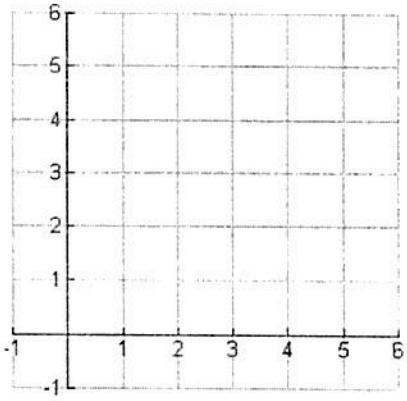
AP Calculus

Name _____

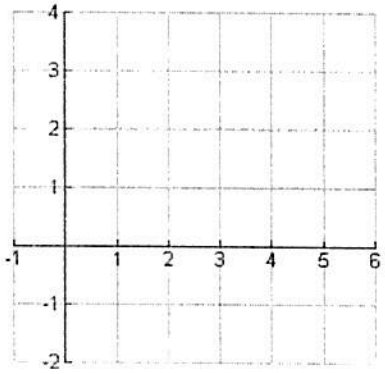
Practice 7.1

Sketch the region bounded by the graphs of the algebraic functions and find the area of the region. **No calculators...exact answers.**

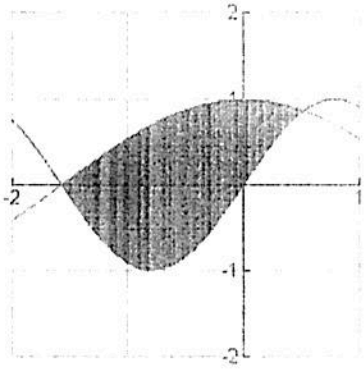
1) $f(x) = -x^2 + 4x + 1$; $g(x) = x + 1$



2) $f(y) = y^2 + 1$; $g(y) = 0$; $y = -1$; $y = 2$



3) Find the area bounded by: $f(x) = \sin(2x)$
$g(x) = \cos(x), \quad -\frac{\pi}{2} \le x \le \frac{\pi}{6}$



Show your integral with limits and then use your calculator to find the solution.

4) Find the area bounded by: $f(x) = -x^2 + 4x + 2, \quad g(x) = x + 2$

5) Find the area bounded by: $y = x^4 - 2x^2, \qquad y = 2x^2$

D1
CW

AP Calculus Name _____

Practice 7.1

Sketch the region bounded by the graphs of the algebraic functions and find the area of the region. **No calculators…exact answers**.

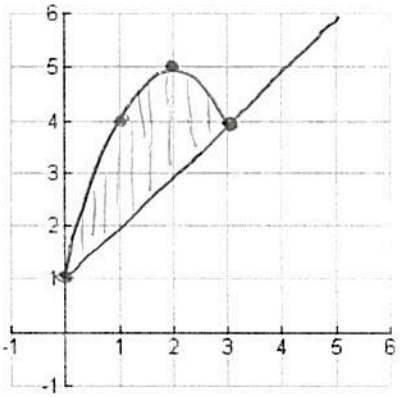
1) $f(x) = -x^2 + 4x + 1$; $g(x) = x + 1$

$$\int_0^3 [(-x^2+4x+1) - (x+1)]\,dx =$$

$$\int_0^3 (-x^2+3x)\,dx =$$

$$-\frac{x^3}{3} + \frac{3}{2}x^2 \Big|_0^3 = -9 + \frac{27}{2}$$

$$= \boxed{9/2}$$



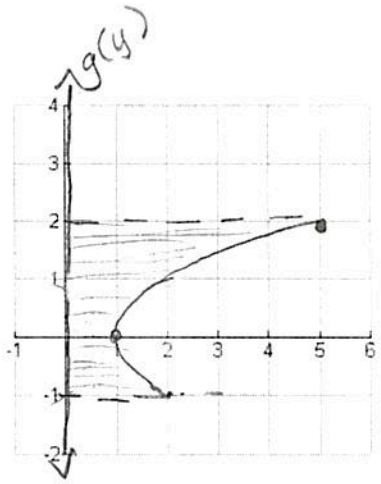
2) $f(y) = y^2 + 1$ (R); $g(y) = 0$ (L); $y = -1$; $y = 2$

$$\int_{-1}^{2} (y^2+1)\,dy =$$

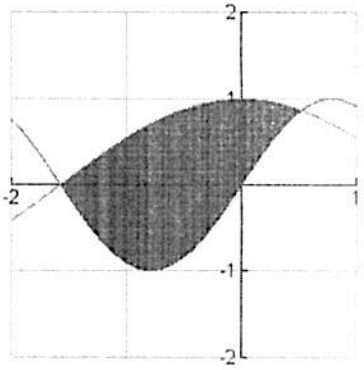
$$\frac{y^3}{3} + y \Big|_{-1}^{2} = \left(\frac{8}{3} + 2\right) - \left(\frac{-1}{3} - 1\right)$$

$$= \frac{8}{3} + 2 + \frac{4}{3}$$

$$= \boxed{6}$$



3) Find the area bounded by: Bottom $f(x) = \sin(2x)$ top $g(x) = \cos(x)$, $-\frac{\pi}{2} \le x \le \frac{\pi}{6}$



$\int_{-\pi/2}^{\pi/6} (\cos x - \sin 2x)\,dx$

$u = 2x$

$du = 2\,dx$

$dx = \frac{1}{2}\,du$

$\sin x - \left(-\frac{1}{2}\cos(2x)\right) =$

$\sin x + \frac{1}{2}\cos(2x) \Big|_{-\pi/2}^{\pi/6}$

$\left(\sin \pi/6 + \frac{1}{2}\cos \pi/3\right) - \left(\sin -\frac{\pi}{2} + \frac{1}{2}\cos -\pi\right)$

$\frac{1}{2} + \frac{1}{4} - \left(-1 + -\frac{1}{2}\right)$

$\frac{3}{4} + \frac{3}{2} =$ **9/4 = 2 1/4**

Show your integral with limits and then use your calculator to find the solution.

4) Find the area bounded by: $f(x) = -x^2 + 4x + 2$, $g(x) = x + 2$

$-x^2 + 4x + 2 = x + 2$

$\int_0^3 \left[(-x^2+4x+2) - (x+2)\right] dx$

$x^2 - 3x = 0$

$x(x-3) = 0$

4.5

5) Find the area bounded by: $y = x^4 - 2x^2$, $y = 2x^2$

$x^4 - 2x^2 = 2x^2$

$x^4 - 4x^2 = 0$

$x^2(x^2-4) = 0$

$0, \pm 2$

$\int_{-2}^{2} (2x^2 - (x^4 - 2x^2))\,dx =$

$\int_{-2}^{2} (4x^2 - x^4)\,dx$

$\frac{4}{3}x^3 - \frac{x^5}{5}\Big|_{-2}^{2} = \left(\frac{32}{3} - \frac{32}{5}\right) - \left(-\frac{32}{3} + \frac{32}{5}\right)$

$\frac{64}{3} - \frac{64}{5} =$ **$\frac{128}{15}$**