Calculus AB 8.2 Area Between 2 Curves Name _____

NO CALCULATOR! All by hand!

1. Find the area enclosed by $f(x)=x^2+2$ *and* $g(x)=2x+5$.

$x^2+2=2x+5$

$x^2-2x-3=0$

$(x-3)(x+1)=0$

$x=3 \quad x=-1$

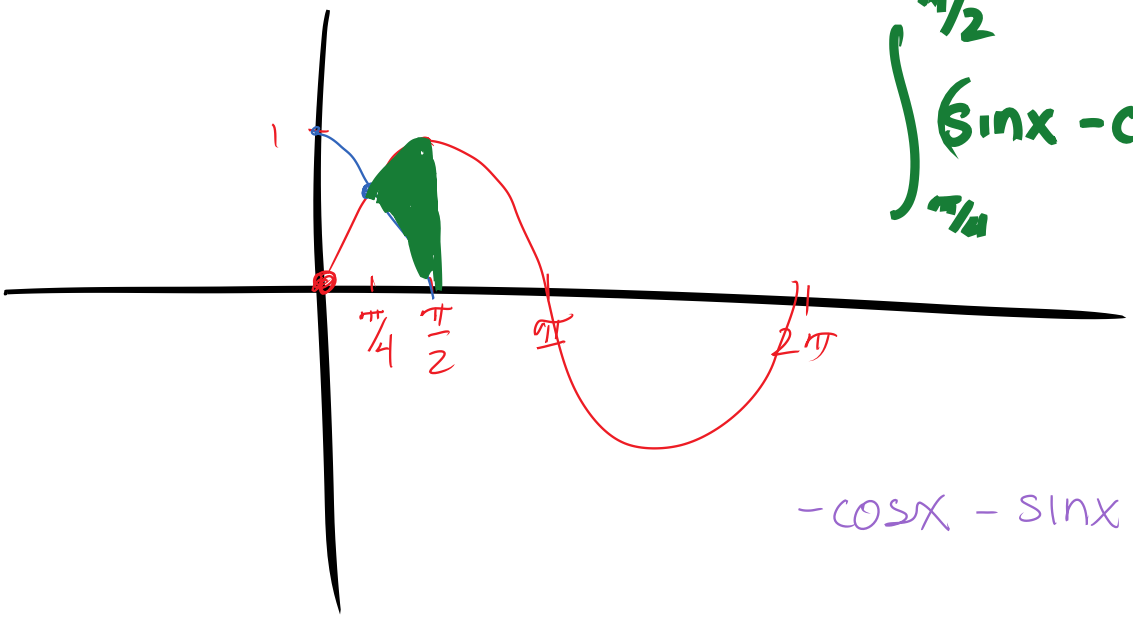
$$\int_{-1}^{3}\left[(2x+5)-(x^2+2)\right]dx$$

$$\int_{-1}^{3}(2x+5-x^2-2)\,dx$$

$$\int_{-1}^{3}(-x^2+2x+3)\,dx$$

$$-\frac{x^3}{3}+x^2+3x\Big|_{-1}^{3} = 10\frac{2}{3}$$

2. Find the area between $y=\sin x$ *and* $y=\cos x$ over the interval $\left[\frac{\pi}{4},\frac{\pi}{2}\right]$.



$$\int_{\pi/4}^{\pi/2}(\sin x-\cos x)\,dx$$

$$-\cos x-\sin x\Big|_{\frac{\pi}{4}}^{\frac{\pi}{2}}$$

$$\left[0-(1)\right]-\left(-\frac{\sqrt{2}}{2}-\frac{\sqrt{2}}{2}\right)$$

$$-1-\left(-\sqrt{2}\right) \quad -1+\sqrt{2}$$

3. Find the area between $x = y^2 + 4y - 22$ and $x = 3y + 8$.

$y^2 + 4y - 22 = 3y + 8$

$y^2 + y - 30 = 0$

$(y+6)(y-5) = 0$

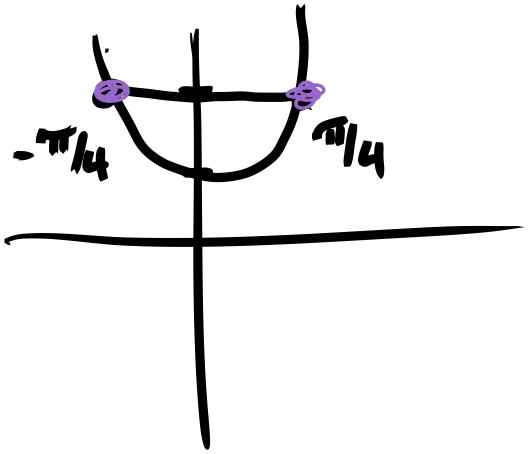
$y = -6 \quad y = 5$

$$\int_{-6}^{5} [(3y+8) - (y^2+4y-22)]\,dy$$

$$\int_{-6}^{5} (3y + 8 - y^2 - 4y + 22)\,dy$$

$$\int_{-6}^{5} (-y^2 - y + 30)\,dy = -\frac{y^3}{3} - \frac{y^2}{2} + 30y \Big|_{-6}^{5} = 221.8\overline{3}$$

4. Find the area of the region bounded by the line y = 2 and the graph of $y = \sec^2 x$ for $-\frac{\pi}{2} < x < \frac{\pi}{2}$.



$$2\int_{0}^{\pi/4} (2 - \sec^2 x)\,dx$$

$$2[2x - \tan x]_{0}^{\pi/4}$$

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

$\pi - 2$