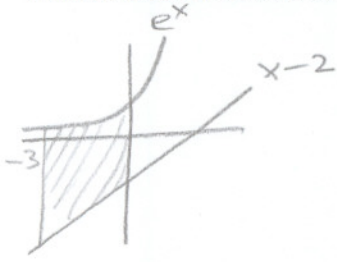
Math 1B
Group Quiz 4
Wed Feb 6, 2008

Names: _____

THIS IS A NO CALCULATOR QUIZ

[3 POINTS] Find the area between the curves $y = x - 2$ and $y = e^x$ on the interval $[-3, 0]$.



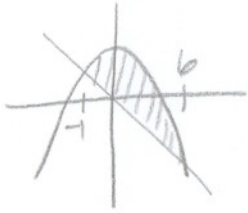
$$\int_{-3}^{0} (e^x - x + 2)\,dx$$

$$= e^x - \tfrac{1}{2}x^2 + 2x \Big|_{-3}^{0}$$

$$= 1 - \left(e^{-3} - \tfrac{9}{2} - 6\right)$$

$$= \tfrac{23}{2} - e^{-3}$$

[3 POINTS] Find the area of the region determined by the intersections of the curves $y = 6 - x^2$ and $y = -5x$.



$$6 - x^2 = -5x$$
$$0 = x^2 - 5x - 6$$
$$0 = (x-6)(x+1)$$
$$x = -1, 6$$

$$\int_{-1}^{6} (6 - x^2 - -5x)\,dx$$

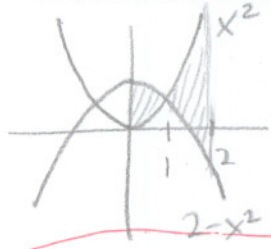
$$= \int_{-1}^{6} (6 + 5x - x^2)\,dx$$

$$= 6x + \tfrac{5}{2}x^2 - \tfrac{1}{3}x^3 \Big|_{-1}^{6}$$

$$= (36 + 90 - 72) - \left(-6 + \tfrac{5}{2} + \tfrac{1}{3}\right)$$

$$= 57\tfrac{1}{6}$$

[4 POINTS] Find the area bounded by the graphs of $y = x^2$ and $y = 2 - x^2$ for $0 \le x \le 2$.



$$x^2 = 2 - x^2$$
$$2x^2 = 2$$
$$x^2 = 1$$
$$x = \pm 1$$

$$\int_0^1 (2 - x^2 - x^2)\,dx + \int_1^2 (x^2 - 2 + x^2)\,dx$$

$$= \int_0^1 (2 - 2x^2)\,dx + \int_1^2 (2x^2 - 2)\,dx$$

$$= \left(2x - \tfrac{2}{3}x^3\right)\Big|_0^1 + \left(\tfrac{2}{3}x^3 - 2x\right)\Big|_1^2$$

$$= \left(2 - \tfrac{2}{3}\right) + \left(\tfrac{16}{3} - 4\right) - \left(\tfrac{2}{3} - 2\right) = \tfrac{12}{3} = 4$$