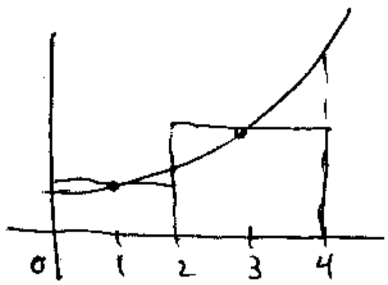
MATH 113 – QUIZ 11 – 4 DECEMBER 2012

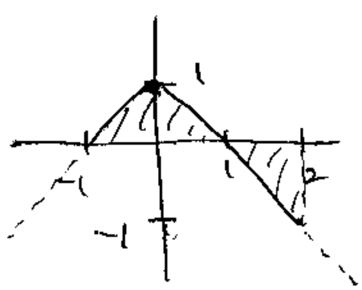
Answer all of the following questions in the space provided. Show all work as partial credit may be given. Answers without justification, even if they are correct, will earn no credit.

1. (5 pts.) Approximate the area under the curve $f(x) = x^2 + 1$ on the interval $[0, 4]$ with a Riemann sum by dividing the interval into 2 equal subintervals, and using the midpoint of each subinterval to estimate the height of each rectangle.




$$\text{Area} \approx \left((1)^2+1\right)(2) + \left((3)^2+1\right)(2)$$
$$= 2\cdot 2 + 10\cdot 2 = \underline{24}$$

2. (5 pts.) Use geometry (not Riemann sums or the Fundamental Theorem of Calculus) to calculate the definite integral $\int_{-1}^{2} (1 - |x|)\,dx$.




$$\int_{-1}^{2} (1-|x|)\,dx = \frac{1}{2}(2)(1) - \frac{1}{2}(1)(1)$$
$$= \frac{1}{2} \;//$$

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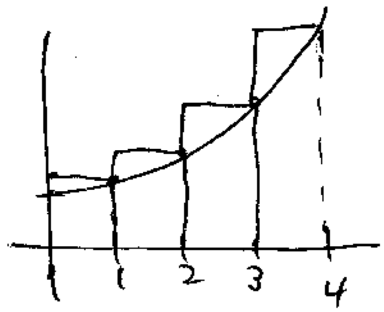
1. (5 pts.) Approximate the area under the curve $f(x) = x^2 + 1$ on the interval $[0, 4]$ with a Riemann sum by dividing the interval into 4 equal subintervals, and using the right endpoint of each subinterval to estimate the height of each rectangle. (Hint: In short, find the Right Riemann sum of the function on the interval.)

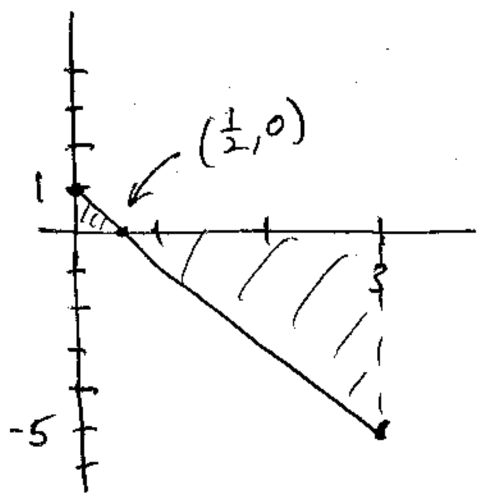



$$\text{Area} \approx ((1)^2+1)(1) + ((2)^2+1)(1) + ((3)^2+1)(1) + ((4)^2+1)(1)$$

$$= 2\cdot 1 + 5\cdot 1 + 10\cdot 1 + 17\cdot 1$$

$$= 34$$

2. (5 pts.) Use geometry (not Riemann sums or the Fundamental Theorem of Calculus) to calculate the definite integral $\int_0^3 (1 - 2x)\, dx$.




$$\int_0^3 (1-2x)\,dx$$

$$= \frac{1}{2}\left(\frac{1}{2}\right)(1) - \frac{1}{2}\left(\frac{5}{2}\right)(+5)$$

$$= \frac{1}{4} - \frac{25}{4} = -6$$

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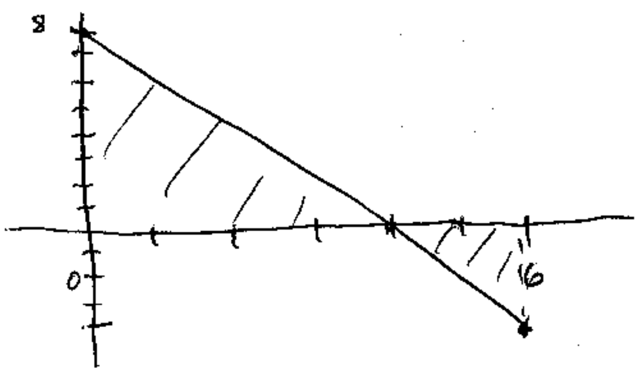
$$\text{Area} \approx ((0)^2+1)(1) + ((1)^2+1)(1) + ((2)^2+1)(1) + ((3)^2+1)(1) = 1 + 2 + 5 + 10 = 18$$

$$\text{Actual area} = \int_0^4 (x^2+1)\,dx = \tfrac{1}{3}x^3 + x \Big|_0^4 = \tfrac{64}{3} + 4 = \tfrac{76}{3} \approx 25.3$$

2. (5 pts.) Use geometry (not Riemann sums or the Fundamental Theorem of Calculus) to calculate the definite integral $\int_0^6 (8 - 2x)\,dx$.




$$\int_0^6 (8-2x)\,dx = \tfrac{1}{2}(4)(8) - \tfrac{1}{2}(2)(4) = 16 - 4 = 12$$