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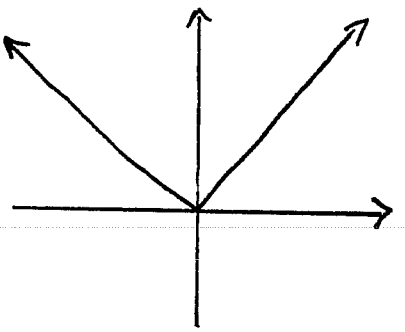
Quiz 4

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(5 marks)* §5.3 #29 Evaluate the integral.



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

$$= \left[\frac{x^2}{2}\right]_{-1}^{2} - 2\left[\int_{-1}^{0}|x|\,dx + \int_{0}^{2}|x|\,dx\right]$$

$$= \frac{2^2}{2} - \frac{(-1)^2}{2} - 2\left[-\int_{-1}^{0}x\,dx + \int_{0}^{2}x\,dx\right]$$

$$= 2-\frac{1}{2} - 2\left[-\left[\frac{x^2}{2}\right]_{-1}^{0} + \left[\frac{x^2}{2}\right]_{0}^{2}\right]$$

$$= \frac{3}{2} - 2\left[\frac{1}{2} + \frac{2^2}{2}\right] = \frac{3}{2} - 2\left[\frac{5}{2}\right] = -\frac{7}{2}$$

Question 2. §5.4 #20

a. *(2 marks)* Find the average value of f on the given interval.

b. *(2 marks)* Find c such that $f_{ave} = f(c)$.

c. *(1 mark)* Sketch the graph of f and a rectangle whose area is the same as the area under the graph of f.

$f(x) = \sqrt{x}$, $[0,4]$

a) $$f_{ave} = \frac{1}{b-a}\int_{a}^{b} f(x)\,dx$$

$$= \frac{1}{4-0}\int_{0}^{4}\sqrt{x}\,dx$$

$$= \frac{1}{4}\left[\frac{2x^{3/2}}{3}\right]_{0}^{4}$$

$$= \frac{1}{4}\left[\frac{2}{3}\,4^{3/2}\right]$$

$$= \frac{1}{4}\left[\frac{2}{3}\cdot 8\right]$$

$$= \frac{4}{3}$$

b) $$\frac{4}{3} = f(c)$$

$$\frac{4}{3} = \sqrt{c}$$

$$\frac{16}{9} = c$$