Practice Test for Midterm III

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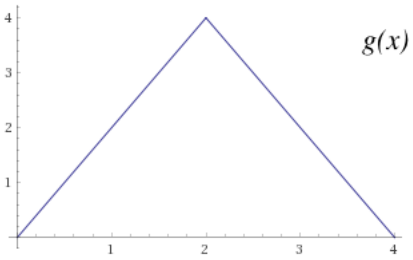
Note: this is more problems than will be on the test, but it should give you a pretty good idea of what to expect in terms of difficulty.

1.)

The graph of a function $g(x)$ is below. Find $f(2), f'(2), h(2)$, and $h'(2)$ if

$$f(x) = \int_0^x g(t)\ dt \text{ and } h(x) = \int_0^{x^2} g(t)\ dt.$$



2.)

Determine a region which has area equal to the given limit. Do not evaluate the limit.

a.)

$$\lim_{n\to\infty} \frac{4}{n} \cos(1 + \frac{4}{n})$$

b.)

$$\lim_{n\to\infty} \frac{3}{n} e^{3+\frac{6}{n}} \sin(1+\frac{3}{n})$$

3.)

Let $g(x) = \int_0^x f(x)\,\mathrm{d}x$. What conditions must f fulfill in order to yield the conclusion from the first part of the fundamental theorem? What is that conclusion?

4.)

Use the ***limit*** definition of an integral to evaluate:

$$\int_2^5 x^2 - x + 1\,\mathrm{d}x$$

5.)

600 gallons of water are stored in a cylindric tank with an inverted-dome bottom. A small hole breaks open at the very bottom at $t = 0$ s