Colby

MA121: Spring 2019

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Practice Final

Disclaimer: This Practice Final consists of problems of a similar difficulty as will be on the actual final. However, **problems on the actual final may or may not be quite different in nature, and may or may not focus on different course material**. However, the actual final will have a similar format: one true/false problem, one short-answer problem, three long-answer problems.

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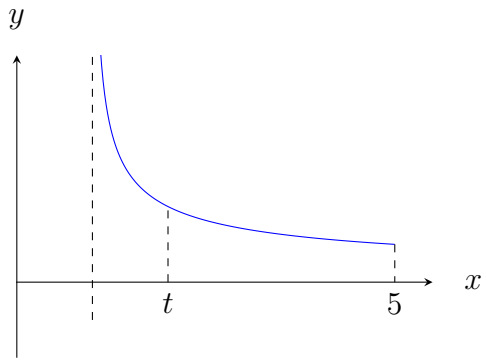
1. True/False (no justification required)
   (a) The function $f(x) = |x|$ does not possess an antiderivative.
   (b) The formula $\int_0^x f''(x)dx = f'(x) - f'(0)$ holds.
   (c) If $F(x)$ is an antiderivative of $f(x)$ then $F'(x) = f(x)$.
   (d) $\int e^{x^2} dx = \dfrac{e^{x^2}}{2x} + C$
   (e) $\lim\limits_{n\to\infty} \sum\limits_{k=1}^{n} \dfrac{\pi \sin(\pi k/n)}{n} = 2$
2. Compute the indefinite integral.
   (a)
   $$\int x\cos(\pi x + e)dx$$
   (b)
   $$\int \frac{1}{x\ln(x)}dx$$
3. Determine the area bounded between the curves $y = 1 - x$ and $y = 1 - x^2$.
4. Consider the function
   $$f(x) = \int_0^{x^2} \sin(t^2)dt$$
   (a) Compute $f'(x)$.
   (b) Determine the equation of the tangent line to the curve $y = f(x)$ at $x = \pi$.
5. Let $f(x) = 1/\sqrt{x-1}$, defined when $x > 1$.
   (a) Let $1 < t < 5$. Compute $A(t) = \int_t^5 f(x)dx$.
   (b) Compute $\lim\limits_{t\to 1^+} A(t)$.
   (c) True/False: the area bounded below $y = f(x)$, $1 < x \leq 5$, is $\lim\limits_{t\to 1^+} A(t)$. **Justify your answer**.


y
x
t
5