Test: Integration

Solutions

Fundamentals of Calculus II

True or False. No justification necessary.

1. If F(x) is an antiderivative of f(x), then f'(x) = F(x). False
2. $\int f(t)g(t)dt = \int f(t)dt * \int g(t)dt$ False
3. $\int_a^b f(x)dx$ is the area under the curve of $f(x)$ between a and b. True
4. The integral of a function always exists. False
5. $\int \ln(x)dx = 1/x + C$
   False

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Evaluate the integrals below. No justification necessary.

6. $\int (2x+1)^3\, dx = \frac{(2x+1)^4}{8} + C$
7. $\int_{-2}^{0} (2x+5)dx$ =6
8. $\int_0^1 \frac{20x^4}{4x^5+1}dx$ =ln(5)

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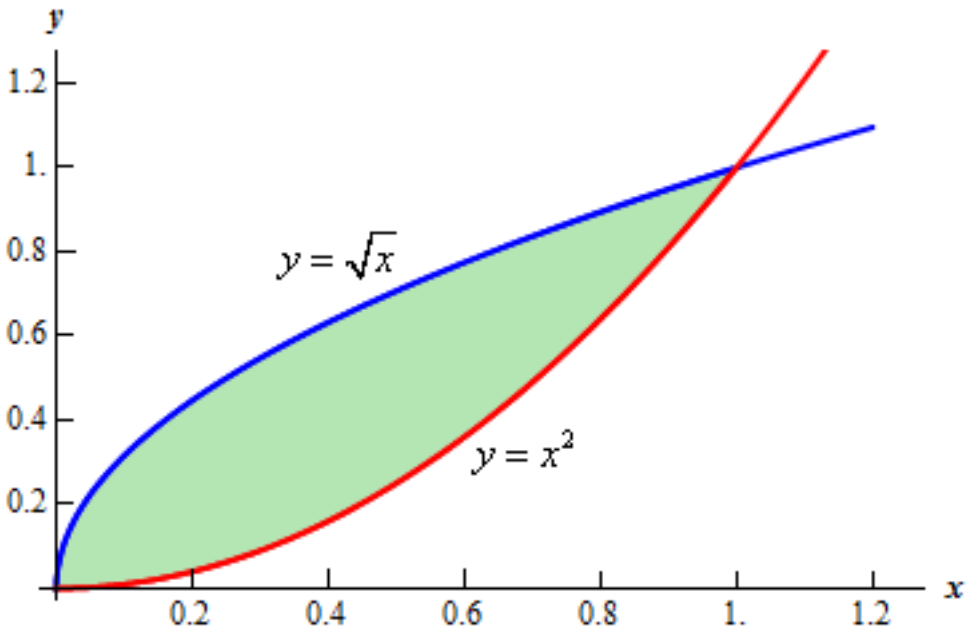
Respond to the questions below.
Explain and justify your thought process.

9. Find the area between the two curves.



The area between the curve is the area below $\sqrt{x}$ minus the area below x^2 for x between 0 and 1. Therefore the integral we need to solve is:

$$\int_0^1 \sqrt{x} - \int_0^1 x^2 dx$$

10. Evaluate

$$\int xe^{3x} dx$$

Integration by parts helps simplify the integral since the derivative of x becomes 1. Therefore letting $u = x$ and $dv = e^{3x}$ we can rewrite the integral interms of another that's much easier.