Calculus

Write your questions and thoughts here!

9.2 Trig Integrals

Name:__________________________

Notes

Recall: What are the six trig derivatives?

$$\frac{d}{dx}\sin x = \qquad \frac{d}{dx}\csc x =$$

$$\frac{d}{dx}\cos x = \qquad \frac{d}{dx}\sec x =$$

$$\frac{d}{dx}\tan x = \qquad \frac{d}{dx}\cot x =$$

Trig Integrals:

$$\int \cos x\,dx = \qquad \int -\csc x\cot x\,dx =$$

$$\int \sin x\,dx = \qquad \int \sec x\tan x\,dx =$$

$$\int \sec^2 x\,dx = \qquad \int \csc^2 x\,dx =$$

Preparing for u-substitution: $\int \cos ax\,dx =$

Find the indefinite integral.

1. $\int -5\sin x\,dx$

2. $\int \frac{2}{\sec x}\,dx$

Evaluate each definite integral.

3. $\int_{\pi/4}^{\pi} -2\cos x\,dx$

4. $\int_{\pi/4}^{3\pi/4} \sec^2 2x\,dx$

5. $\int_{-\pi/16}^{0} \sec 4x\tan 4x\,dx$

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Recall the inverse trig derivatives. Remember that arcsine(x) is the same as $\sin^{-1} x$.

Inverse Trig Derivatives:

$\frac{d}{dx}\sin^{-1}(x) =$	$\frac{d}{dx}\cos^{-1}(x) =$
$\frac{d}{dx}\sec^{-1}(x) =$	$\frac{d}{dx}\csc^{-1}(x) =$
$\frac{d}{dx}\tan^{-1}(x) =$	$\frac{d}{dx}\cot^{-1}(x) =$

Taking the integral is just going the other direction!

Find the indefinite integral.

6. $\int -\frac{1}{\sqrt{1-x^2}}\,dx$

7. $\int \frac{3}{9x^2+1}\,dx$

8. $\int -\frac{1}{|x|\sqrt{4x^2-1}}\,dx$

9. $\int \frac{20x^3}{\sqrt{1-25x^8}}\,dx$

Now summarize what you learned!

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Calculus Name: ______________________________ **Practice**

In this practice set you will find definite integrals, indefinite integrals, AND derivatives.

1. $\int (\cos x - 5\sin x)\,dx$

2. $\int \sec x\,(\sec x + \tan x)\,dx$

3. $\int_{\pi/4}^{\pi} 2\cos x\,dx$

4. $\int_{-3\pi/4}^{-\pi/2} \sin x\,dx$

5. $\int_{\pi/9}^{2\pi/9} 3\csc^2 3x\,dx$

6. $\int_{\pi/6}^{\pi/4} \csc 2x \cot 2x\,dx$

7. $\int \frac{3}{|x|\sqrt{36x^6 - 1}}\,dx$

8. $\int -\frac{2}{4x^2 + 1}\,dx$

9. $\frac{d}{dx}\sin 5x$

10. $\frac{d}{dx}\sec^2 2x$

11. $\int (\sec^2 x + x)\,dx$

12. $\int \frac{\sin x}{\cos^2 x}\,dx$

13. $\int_0^{\pi} \sec x \tan x \, dx$

14. $\int_{-\pi/4}^{\pi} \sin 2x \, dx$

15. $\int \frac{20x^4}{\sqrt{1-16x^{10}}} dx$

16. $\int \frac{\cos^3 x + 4}{\cos^2 x} dx$

17. $\int x - \frac{2}{\cos^2 x} dx$

18. $\int \frac{36x^3}{1+81x^8} dx$

19. $\int \frac{1}{\csc x} dx$

20. $\frac{d}{dx} \cos 3x$

21. $\int_{\pi/2}^{\pi/2} \csc(\cot(\sec x)) \, dx$

22. $\frac{d}{dx} \sec x \tan x$

23. $\int_{\pi/4}^{5\pi/4} \sec^2 x \, dx$

24. $\int \frac{\sin 2x}{\cos x} dx$

Hint: $\sin 2x = 2 \sin x \cos x$

25. $\int_{\pi}^{\frac{\pi}{2}} 3 \sin 5x \, dx$

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Test Prep

1. What is the x-coordinate of the point of inflection on the graph of $y = \frac{1}{10}x^5 + \frac{1}{2}x^4 - \frac{3}{10}$?

(A) -4 (B) -3 (C) -1

(D) $-\frac{3}{10}$ (E) 0

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2. If f, is a linear function and $0 < a < b$, then $\int_a^b f''(x)\, dx =$

(A) 0 (B) 2 (C) $\frac{ab}{2}$

(D) $m(a-b)$ (E) $\frac{a^2-b^2}{2}$

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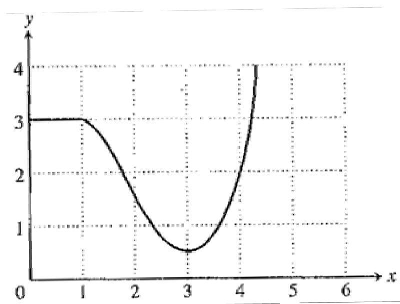
3. The graph of f is shown. If $\int_1^4 f(x)\, dx = 3.8$ and $F'(x) = f(x)$, then $F(4) - F(0) =$



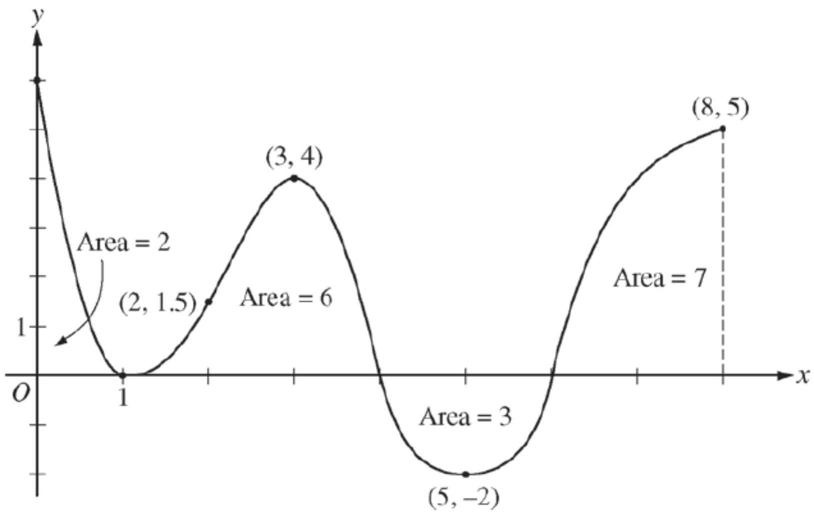
(A) 0.8 (B) 2.8 (C) 4.8 (D) 6.8 (E) 8.4

4. At time $t \geq 0$, the acceleration of a particle that is moving along the x-axis is $a(t) = t + 2\sin t$. At $t = 0$, the velocity of the particle is -4. For what value of t will the velocity of the particle be zero?

(A) 0 (B) 1.20 (C) 1.78 (D) 2.31 (E) 3.87

FREE RESPONSE **Your score: _______ out of 9**

2013 AB4



Graph of f'

The figure above shows the graph of f', the derivative of a twice-differentiable function f, on the closed interval $0 \leq x \leq 8$. The graph of f' has horizontal tangent lines at $x = 1, x = 3$, and $x = 5$. The areas of the regions between the graph of f' and the x-axis are labeled in the figure. The function f is defined for all real numbers and satisfies $f(8) = 4$.

(a) Find all values of x on the open interval $0 < x < 8$ for which the function f has a local minimum. Justify your answer.

(b) Determine the absolute minimum value of f on the closed interval $0 \leq x \leq 8$. Justify your answer.

(c) On what open intervals contained in $0 < x < 8$ is the graph of f both concave down and increasing? Explain your reasoning.

(d) The function g is defined by $g(x) = \left(f(x)\right)^3$. If $f(3) = \frac{5}{2}$, find the slope of the line tangent to the graph of g at $x = 3$.