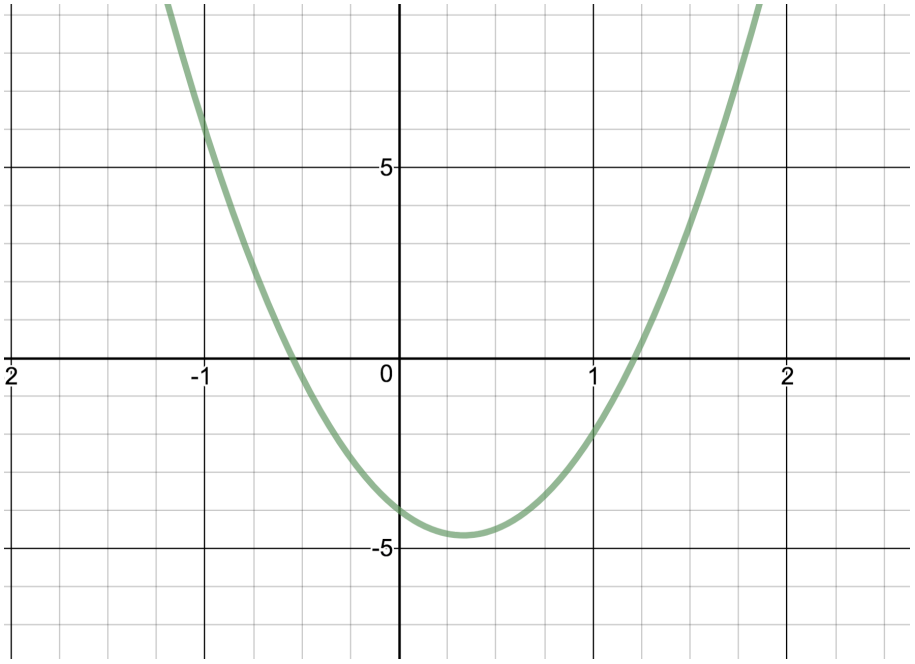
Math 5A Homework 3.9: Antiderivatives

Show all work neatly with clear presentations. Name: _____

Key points from section:
(Though not on here, make sure you can also do "falling body" problems like Ex 7)

(1) The graph of a function f is given. Make a rough sketch of an antiderivative F(x) given that F(0)=1 (see example 5)



(2) Find the most general antiderivative of the function given. What notation would be used for this antiderivative (i.e. f(x), f'(x), F(x) …)?. (Answers not given because you can check you answer by differentiation =))

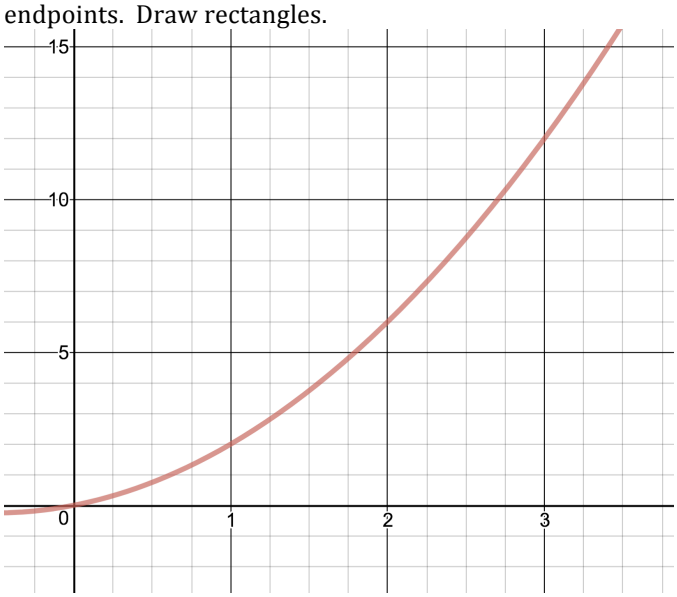
a) $f(x) = 4x^3 + 2\sin x$

b) $g'(x) = 5\sqrt{x} - 7x^{2/3}$

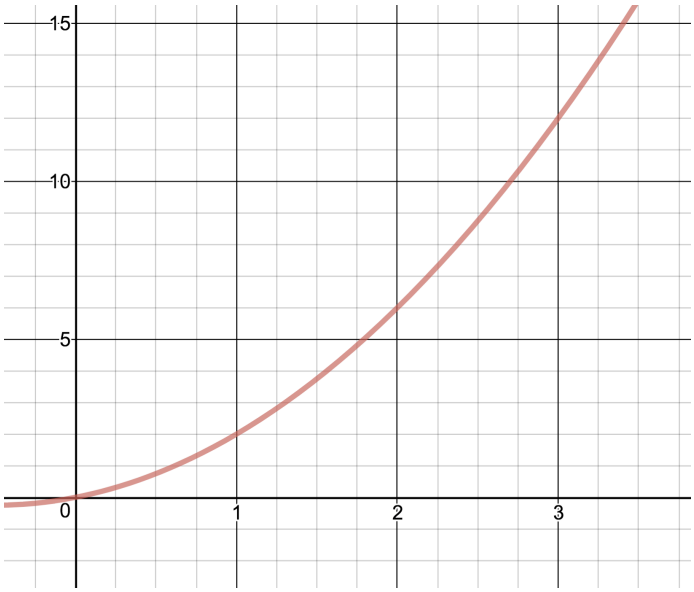
Show all work neatly with clear presentations. Name: _____

Key points from section:

1) Estimate the area under the graph of f(x) over [0,3] using 6 rectangles with sample points being left endpoints. Draw rectangles.



2) Estimate the area under the graph of f(x) over [0,3] using 6 rectangles with sample points being midpoints. Draw rectangles.



Math 5A Homework 4.2 Definite Integral, Riemann Sum 1/1

Show all work neatly with clear presentations. Name: _____

Key points from section:

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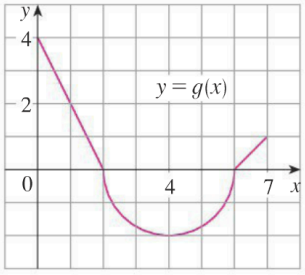
1) *(ans ?)*

The graph of g consists of two straight lines and a semi-circle. Use it to evaluate each integral.

(a) $\int_0^2 g(x)\,dx$ (b) $\int_2^6 g(x)\,dx$ (c) $\int_0^7 g(x)\,dx$



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2) Given the curve $y = x^2$ over the interval [1,3],

(a) Estimate the area under the graph of f(x) using 4 approximating rectangles and taking the sample points to be the right end points. *(ans 10.75)*

(b) Find the exact value for the area under the curve using the Riemann sums definition of an integral using right endpoints of each subinterval as sample points. Show details carefully. (see example 2b) *(ans 26/3)*

$$\sum_{i=1}^{n} i = \frac{n\,(n+1)}{2}$$

$$\sum_{i=1}^{n} i^2 = \frac{n\,(n+1)(2n+1)}{6}$$

$$\sum_{i=1}^{n} i^3 = \left[\frac{n\,(n+1)}{2}\right]^2$$

Math 5A Homework 4.3 – FTC 1/1

Show all work neatly with clear presentations. Name: _____

Key points from section: What does FTC tell us?

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1) The goal if this problem is to help you better understand the next problem. Given $f(t) = t^2$

a) Compute $\int_1^3 f(t)dt$

b) Compute $g(x) = \int_1^{\sin x} f(t)dt$

c) Compute $g'(x)$

2) FTC part 1: Given $g(x) = \int_2^{\cos x} \sqrt{1+t^2}\,dt$, compute $g'(x)$

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3) FTC part ii: Evaluate the following integrals

a) $\int_0^{\pi/4} \left(\cos x + \sec^2 x\right)dx$ *ans:* $\frac{\sqrt{2}}{2}+1$

b) $\int_1^8 \left(4x + x^{2/3}\right)dx$ *ans: 723/5*

c) $\int_{-2}^{-1} \frac{x^4-3}{x^2}dx$ *ans: 5/6*

Math 5A Homework 4.4– Indefinite Inegral 1/1

Show all work neatly with clear presentations. Name: _____

Key points from section:

Indefinite Integral: $\int f(x)dx$ Output is a function, "+C"

Definite Integral: $\int_a^b f(x)dx$ Output is a number.

Find the following:

1) $\int \sec x \tan x \, dx$

ans: secx + C

2) $\int v^2(v^{1/3}+5)\, dv$

ans: $\frac{3}{10}v^{10/3}+\frac{5}{3}v^3+C$

3) $\int_0^{\pi/3} \frac{\sin\theta+\sin\theta\tan^2\theta}{\sec^2\theta}\, d\theta$

(hint: simplify first)

ans: ½

4) $\int_1^9 \frac{t+1}{\sqrt{t}}\, dt$

ans: 64/3

5) $\int_2^4 \left| x^2-2x-3 \right| dx$

ans: 4

Math 5A Homework 4.5 u-substitution 1/1

Show all work neatly with clear presentations. Name: _____

Key points from section:

GET REALLY, REALLY GOOD AT THIS!

Watch notation if you don't change to u's limits

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1) $\int_0^4 t\sqrt{t^2+9}\,dt$ *ans: 98/3*

2) $\int x\sqrt{5x+1}\,dx$

ans: $\frac{2}{125}(5x+1)^{5/2}-\frac{2}{75}(5x+1)^{3/2}+C$

3) $\int \sin(5\theta)d\theta$ *ans:* $-\frac{1}{5}\cos(5\theta)+C$

4) $\int_{-\pi/2}^{\pi/2} \frac{\cos x}{\sqrt{\sin x+1}}\,dx$ *ans:* $2\sqrt{2}$

Math 5A Homework 5.1 Area Between Curves 1/1

Show all work neatly with clear presentations. Name: _____

Key points from section:

1) Given the region bounded by the graphs of $y=x^2$, $y= - x+6$, and the x axis (the shaded region shown)
   (a) find the area by integrating with respect to x.
   (b)find the area by integrating with respect to y.

ans: 32/3