Bekki George
bekki@math.uh.edu
639 PGH

Office Hours (starting next Monday):

Mondays 1-2pm,
Fridays noon-1pm
(also available by appointment)

Class webpage:

http://www.math.uh.edu/~bekki/Math1432.html

$$\int e^{3x}\sqrt{e^x+1}\,dx$$

$u = e^x + 1 \rightarrow e^x = u - 1$

$du = e^x\,dx$

$e^{2x} = (e^x)^2 = (u-1)^2$

$$= \int \underbrace{e^{2x}}_{} \cdot \underbrace{e^x}_{=} \underbrace{\sqrt{e^x+1}}_{} \underbrace{dx}_{=}$$

$$\int (u-1)^2 \sqrt{u}\,du = \int (u^2 - 2u + 1)\,u^{1/2}\,du$$

$$= \int \left(u^{5/2} - 2u^{3/2} + u^{1/2}\right) du$$

$$\frac{2}{7}u^{7/2} - 2\cdot\frac{2}{5}u^{5/2} + \frac{2}{3}u^{3/2} + C$$

$$\frac{2}{7}(e^x+1)^{7/2} - \frac{4}{5}(e^x+1)^{5/2} + \frac{2}{3}(e^x+1)^{3/2} + C$$

$$\int \underline{e^x} \underbrace{\sqrt{e^x+1}} \, \underline{dx}$$

$u = e^x + 1$

$du = e^x \, dx$

$$\int \sqrt{u} \, du = \int u^{1/2} du = \frac{2}{3} u^{3/2} + C$$

$$\frac{2}{3}(e^x+1)^{3/2} + C$$

current page =
Calendar

Work
- Submit Work
- Verify Your Upload

Grades
- View Grades
- Letter Grade Calculator

Misc
- Forum
- unread post(s)
- Forum Search
- Calendar
- Help
- Change Password

Log Out

[redacted]
student
Math 1432
99997
Spring 2016

99997

Welcome to Math 1432 Online Recitations

Use this link to access the online classroom during the times indicated on the calendar below.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
January 10	**January 11**	**January 12**	**January 13**	**January 14**	**January 15**	**January 16**
January 17	**January 18**	**January 19** Classes begin **Lab Week 1 Option 1 (canceled today)** ~~Time: 4-5:30pm~~ ~~TA: Junyu Ding~~ **Option 2** Time: 6-7:30pm TA: Kayla Bicol Notes, Video	**January 20** **Lab Week 1 Option 3** Time: 2-3:30pm TA: Robert Delaney (Substitute Kayla) Notes, Video	**January 21** **Lab Week 1 Option 4** Time: 4-5:30pm TA: Junyu Ding **Option 5** Time: 6-7:30pm TA: Kayla Bicol Notes	**January 22** **TODAY** **Lab Week 1 Option 6** Time: 1-2:30pm TA: Robert Delaney **Option 7** Time: 6-7:30pm TA: Khanh Nguyen	**January 23** **Lab Week 1 Option 8** Time: 1-2:30pm TA: Robert Delaney

January 24	January 25	January 26	January 27	January 28	January 29	January 30
Lab Week 2A **Option 1** Time: 6-7:30pm TA: Khanh Nguyen	**Lab Week 2A** **Option 2** Time: 2-3:30pm TA: Robert Delaney	**Lab Week 2A** **Option 3** Time: 4-5:30pm TA: Junyu Ding **Option 4** Time: 6-7:30pm TA: Kayla Bicol	**Lab Week 2A** **Option 5** Time: 2-3:30pm TA: Robert Delaney	**Lab Week 2B** **Option 1** Time: 4-5:30pm TA: Junyu Ding **Option 2** Time: 6-7:30pm TA: Kayla Bicol	**Lab Week 2B** **Option 3** Time: 1-2:30pm TA: Robert Delaney **Option 4** Time: 6-7:30pm TA: Khanh Nguye	**Lab Week 2B** **Option 5** Time: 1-2:30pm TA: Robert Delaney

Pick 1

Pick 1

Courses Profile

MATH 1432 [SEC::21456] Proctored Exams Online Assignments Grade Book Assignments **EMCF**

EMCF (Electronic Multiple Choice Form)

EMCF with Mixed Format

Select An EMCF

EMCF Name	No Of Questions	No Of Choices	Start Date Time	End Date Time	Select
OnlineLQ1	10	6	1/22/2016 9:43:00 AM	1/30/2016 11:59:00 PM	Select

---

MATH 1432 [SEC::21456] Proctored Exams Online Assignments Grade Book Assignments **EMCF**

EMCF (Electronic Multiple Choice Form)

OnlineLQ1

1) ○A ○B ●C ○D ○E ○F

2) ○A ○B ○C ○D ○E ○F

3) ○A ○B ○C ○D ○E ○F

4) ○A ○B ○C ○D ○E ○F

5) ○A ○B ○C ○D ○E ○F

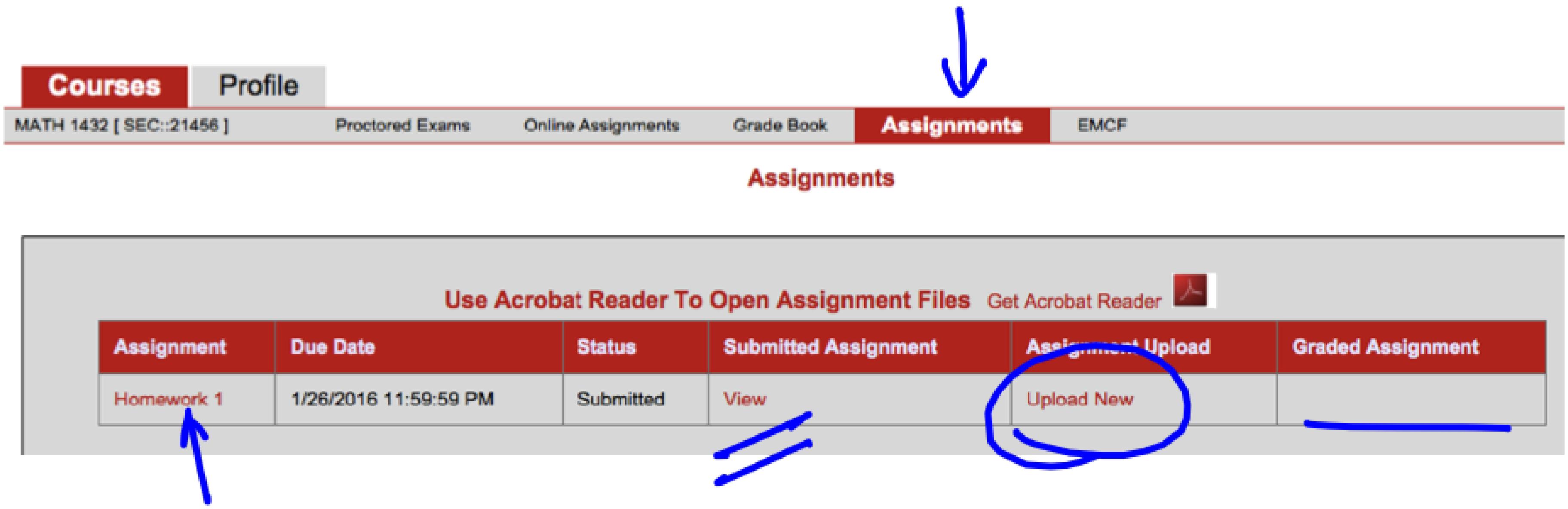
6) ○A ○B ○C ○D ○E ○F

7) ○A ○B ○C ○D ○E ○F

8) ○A ○B ○C ○D ○E ○F

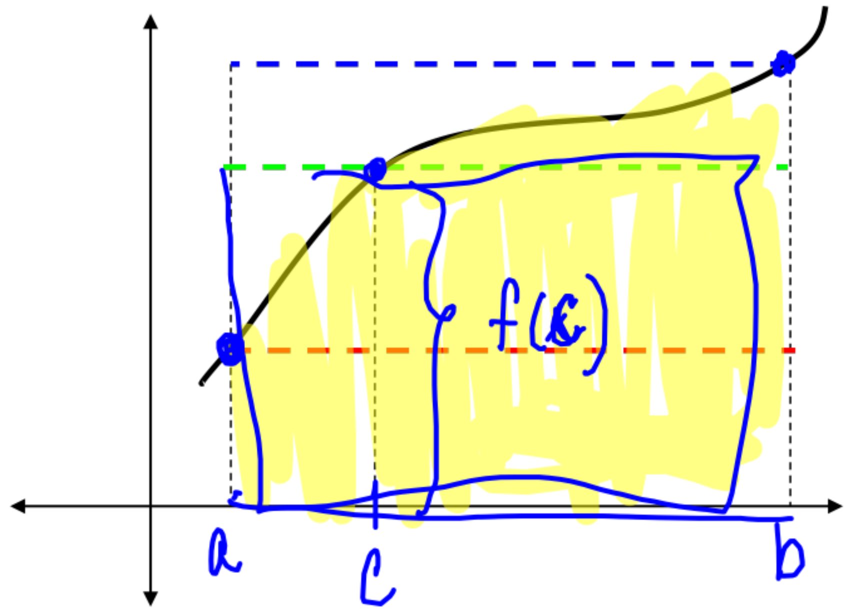
9) ○A ○B ○C ○D ○E ○F

10) ○A ○B ○C ○D ○E ○F

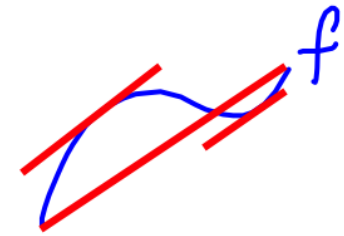

Courses
Profile
MATH 1432 [SEC::21456]
Proctored Exams
Online Assignments
Grade Book
Assignments
EMCF
Assignments
Use Acrobat Reader To Open Assignment Files
Get Acrobat Reader
Assignment
Due Date
Status
Submitted Assignment
Assignment Upload
Graded Assignment
Homework 1
1/26/2016 11:59:59 PM
Submitted
View
Upload New

Section 7.2

Average Value
(Mean Value Theorem for Integrals)



Calc I MVT



First Mean Value Theorem for Integrals: (Average Value Thm)

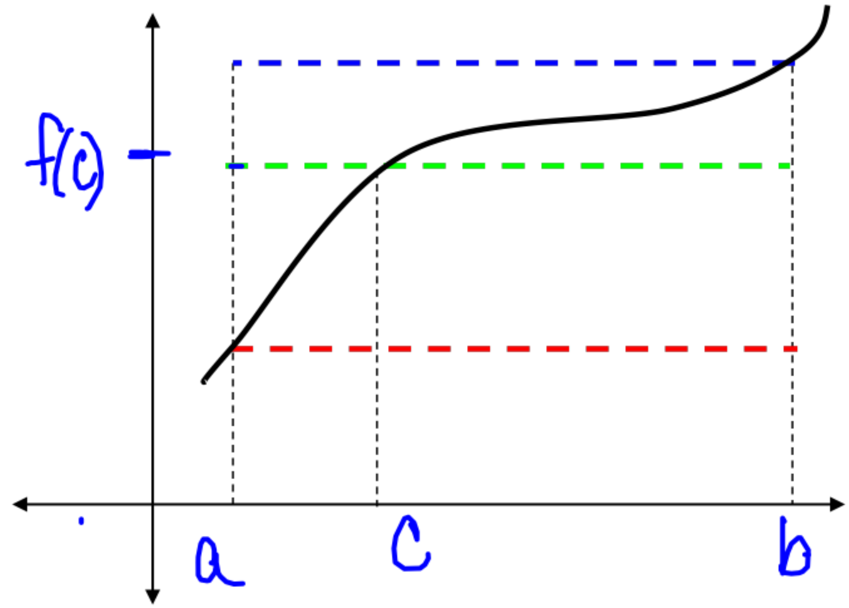
If f is continuous on [a, b], then there is at least one number c in (a, b) for which

$$\int_a^b f(x)\,dx = f(c)(b-a)$$

The number f (c) is called the average (mean) value of f on [a, b].

The area of the region under the graph of f is equal to the area of the rectangle whose height is the average value.

$$\int_a^b f(x)\,dx = \underline{\underline{f(c)}}\,(b-a)$$

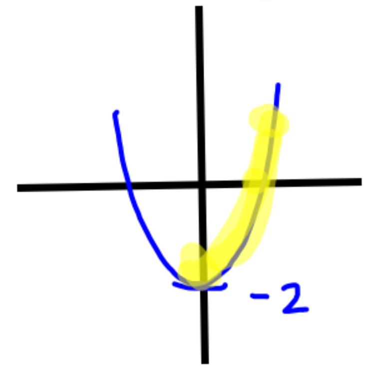


So….

If f is integrable on [a, b], then the average value of f on the interval is:

$$\text{Average value} = \underbrace{f(c) = \frac{1}{(b-a)}\int_a^b f(x)\,dx}$$

1. Find the average value of the function over the interval and find the value(s) of x (the value(s) of c) in the interval for which the function equals its average value:



$$f(x) = x^2 - 2 \quad \overbrace{[0,2]}^{}$$

$$\quad\quad\quad\quad\quad\quad\quad a \;\; b$$

$$f(c) = \frac{1}{2-0}\int_0^2 (x^2-2)\,dx$$

$$= \frac{1}{2}\int_0^2 (x^2-2)\,dx = \frac{1}{2}\left[\frac{x^3}{3} - 2x\right]_0^2$$

$$= \frac{1}{2}\left[\left(8/3 - 4\right) - (0-0)\right] = \frac{1}{2}\left[\frac{-4}{3}\right] = \boxed{\frac{-2}{3}} \quad f(c)$$

$$x^2 - 2 = -2/3$$

$$x^2 = 4/3$$

$$x = \pm\sqrt{4/3} = \pm\, 2/\sqrt{3}$$

$$\boxed{c = 2/\sqrt{3}} \leftarrow$$

2. Find the average value of the function over the interval.

$f(x)=2x^3+3x^2 \quad [\overset{a}{1},\overset{b}{4}]$

$$f(c)=\frac{1}{4-1}\int_1^4\left(2x^3+3x^2\right)dx = \frac{1}{3}\left[\cancel{2}\cdot\frac{x^4}{\cancel{4}\,2}+\cancel{3}\cdot\frac{x^3}{\cancel{3}}\right]_1^4$$

$$=\frac{1}{3}\left[\left(\frac{256}{2}+64\right)-\left(\frac{1}{2}+1\right)\right]=\frac{1}{3}\left(192-\frac{3}{2}\right)=64-\frac{1}{2}$$

$$=\frac{128}{2}-\frac{1}{2}=\boxed{\frac{127}{2}}$$

3. The average value of $\cos x$ over the interval $\overset{a}{\frac{\pi}{6}}\le x\le\overset{b}{\frac{\pi}{2}}$ is

$$f(c)=\frac{1}{\frac{\pi}{2}-\frac{\pi}{6}}\int_{\pi/6}^{\pi/2}\cos x\,dx = \frac{3}{\pi}\left[\sin x\right]_{\pi/6}^{\pi/2}$$

$$=\frac{3}{\pi}\left[\sin\frac{\pi}{2}-\sin\frac{\pi}{6}\right]=\frac{3}{\pi}\left[1-\frac{1}{2}\right]=\frac{3}{\pi}\left(\frac{1}{2}\right)=\boxed{\frac{3}{2\pi}}$$

4. Find the average value of $y = 4t^3 - 3t^2$ over $\overset{a}{-1} \le t \le \overset{b}{2}$.

$$f(c) = \frac{1}{2-(-1)}\int_{-1}^{2}(4t^3-3t^2)\,dt = \frac{1}{3}\left(t^4 - t^3\right)\Big|_{-1}^{2}$$

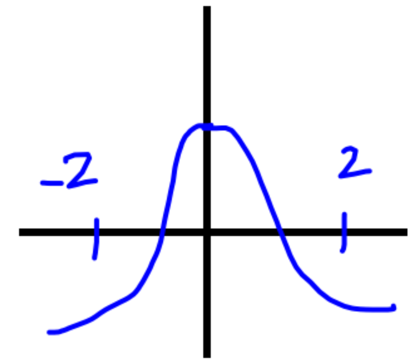
$$= \frac{1}{3}\Big((16-8)-(1-(-1))\Big) = \frac{1}{3}(6) = \boxed{2}$$

5. Find the average value: $f(x) = e^x - \sin x, \quad x \in \left[0, \frac{\pi}{2}\right]$

$$f(c) = \frac{1}{\pi/2}\int_0^{\pi/2}(e^x - \sin x)\,dx = \frac{2}{\pi}\left[e^x + \cos x\right]_0^{\pi/2}$$

$$= \frac{2}{\pi}\left[(e^{\pi/2}+0)-(\underbrace{e^0}_{1}+1)\right] = \boxed{\frac{2}{\pi}\left(e^{\pi/2}-2\right)}$$

6. Given that the average value of an **even** function $f(x)$ over the interval $[-2,2]$ is 3, find $\int_0^2 f(x)\,dx$.



$$A.V. = f(c) = 3 = \frac{1}{2-(-2)} \int_{-2}^{2} f(x)\,dx$$

$$3 = \frac{1}{4} \int_{-2}^{2} f(x)\,dx$$

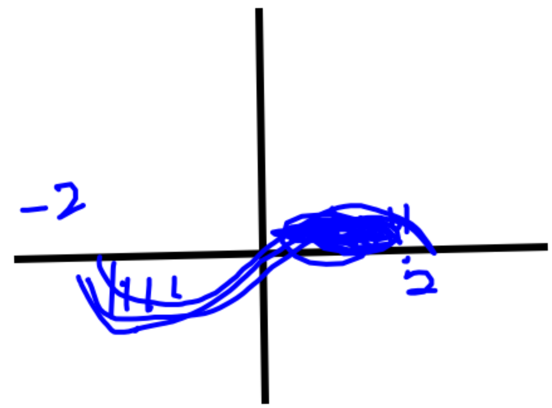
$$12 = \int_{-2}^{2} f(x)\,dx$$

So $\int_0^2 f(x)\,dx = 6$

7. Suppose f is an **odd** function with $\int_0^2 f(x)\,dx = 3$. Give the average value over the interval $[-2,2]$.

$$\int_{-2}^{2} f(x)\,dx = 0$$

So $f(c) = 0$



8. Suppose that $f(1)=6$ and that $f'(x) = x + 1$. Find $f(3)$.

$$\int_a^b f'(x)\,dx = f(x)\Big|_a^b = f(b) - f(a)$$

$$\int_1^3 (x+1)\,dx = f(3) - f(1)$$

$$\left[\frac{x^2}{2} + x\right]_1^3 =$$

$$\left(\frac{9}{2}+3\right) - \left(\frac{1}{2}+1\right) = f(3) - 6$$

$$\frac{9}{2} + 3 - \frac{1}{2} - 1$$

$$6 = f(3) - 6$$

$$\boxed{12 = f(3)}$$

9. What is the approximate instantaneous rate of change for $f(t)=\int_0^{2t} x\sin x\,dx$ at $t=\frac{\pi}{3}$?

deriv.

$$f'(t) = \frac{d}{dt}\int_0^{2t} x \sin x \, dx \Big|_{t=\pi/3}$$

$$(2t)\sin(2t)\cdot 2 \Big|_{t=\pi/3}$$

$$4\cdot\left(\pi/3\right)\sin\left(2\pi/3\right)$$

10. For what values of k is the following equation true?

$$\int_{-1}^{k} 4x\,dx = 0$$

$$2x^2 \Big|_{-1}^{k} = 2k^2 - 2 = 0$$

$$k^2 = 1$$

$$k = \pm 1$$

11. The function f is differentiable and $\int_0^x (f(t)+3t)\,dt = \cos(x)$. Determine the value of $f'\left(\frac{\pi}{3}\right)$

$$\frac{d}{dx}\int_0^x (f(t)+3t)\,dt = \frac{d}{dx}\cos x$$

$$f(x)+3x = -\sin x$$

$$f(x) = -\sin x - 3x$$

$$f'(x) = -\cos x - 3$$

$$f'(\pi/3) = -\cos \pi/3 - 3 = \underline{\qquad}$$