STRATEGIES FOR DUAL CREDIT SUCCESS: *BUILDING CONNECTIONS, RIGOR, AND QUALITY*

Adam Bowden

Instructor – Dual Credit Mathematics

Texas A&M University – Commerce

Adam.Bowden@tamuc.edu

Topics

- Dual Credit Math @ TAMU – C
- Challenges
- Strategies
  - *University Standards and Course Content*
  - *Collaboration and Coordination*
  - *Student Success*
- Conclusions

Dual Credit Math @ TAMU - C

- Offered at five high schools
  - *Commerce ISD*
  - *Boles ISD*
  - *Caddo Mills ISD*
  - *Royse City ISD*
  - *Melissa ISD*
- Embedded Teachers/Adjuncts at Two Schools
- Full Time Faculty for Three Schools

Dual Credit Math @ TAMU - C

- Courses offered (availability varies by school)
  - *College Algebra*
  - *Pre – Calculus*
  - *Calculus I*
- Class size ranges from low teens up to 30
- High school juniors and seniors who are TSI complete
- Taught on site during their class periods (approx. 45 min.)
- Depending on teacher availability, classes held two to five days per week.

Dual Credit Math @ TAMU - C

- Administrative Structure
  - *Associate Provost*
    - Oversees most aspects of dual credit administration
  - *Math Department*
    - Coordinator of College Algebra (Associate Professor)
    - Subject specific curriculum and standards (Department Head)

Full Time Dual Credit Instructor

- Established in 2015 in order to teach 4 – 5 dual credit classes per semester
- Up to 3 schools visited per semester
- Classes scheduled for either 2 or 3 days a week depending on location
- As the number of schools has increased, a component of coordination has been added

CHALLENGES

Challenges

- Scheduling
  - *School Schedule vs. University Schedule*
    - Furthermore, 45min vs. 50min periods
  - *Limited number of teaching days per week*
  - *Extra curricular activities*
  - *School events (drills, assemblies, etc.)*
  - *Time for office hours / tutoring*
- Coordination
  - *Collaboration with instructors at other schools*
- Keeping to university standards of rigor and testing

Scheduling

- Standard university time frame:

  50 minutes / 3 days a week / 16 weeks

  - *Curriculum designed for this time frame*
- School closures still observed
  - *Often more days off than the university*
- School may start earlier than university
  - *This may offset some missed days*
- Class ends with the university finals week
  - *Often earlier than school ends for Christmas or Summer*

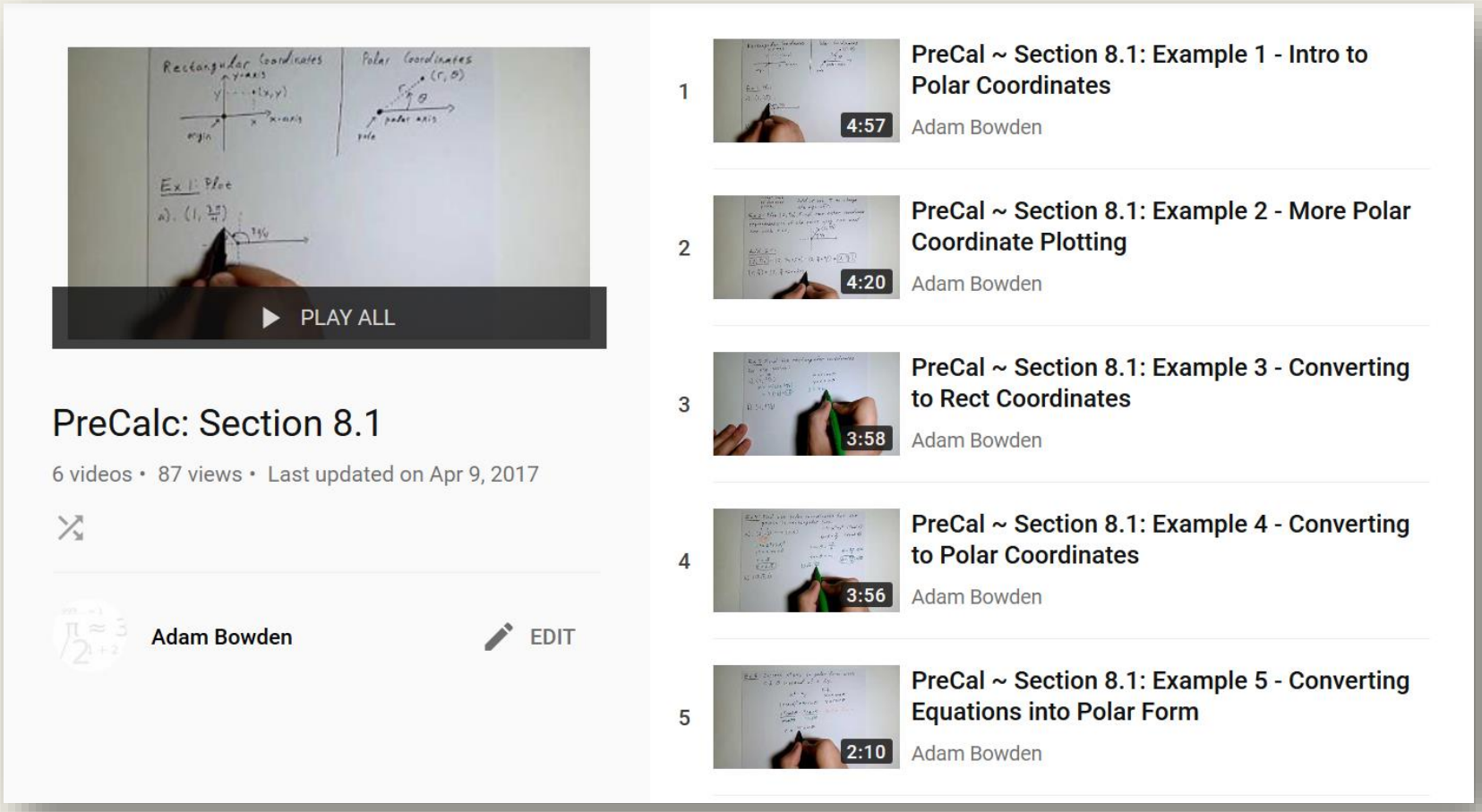
STRATEGIES

Videos

Videos

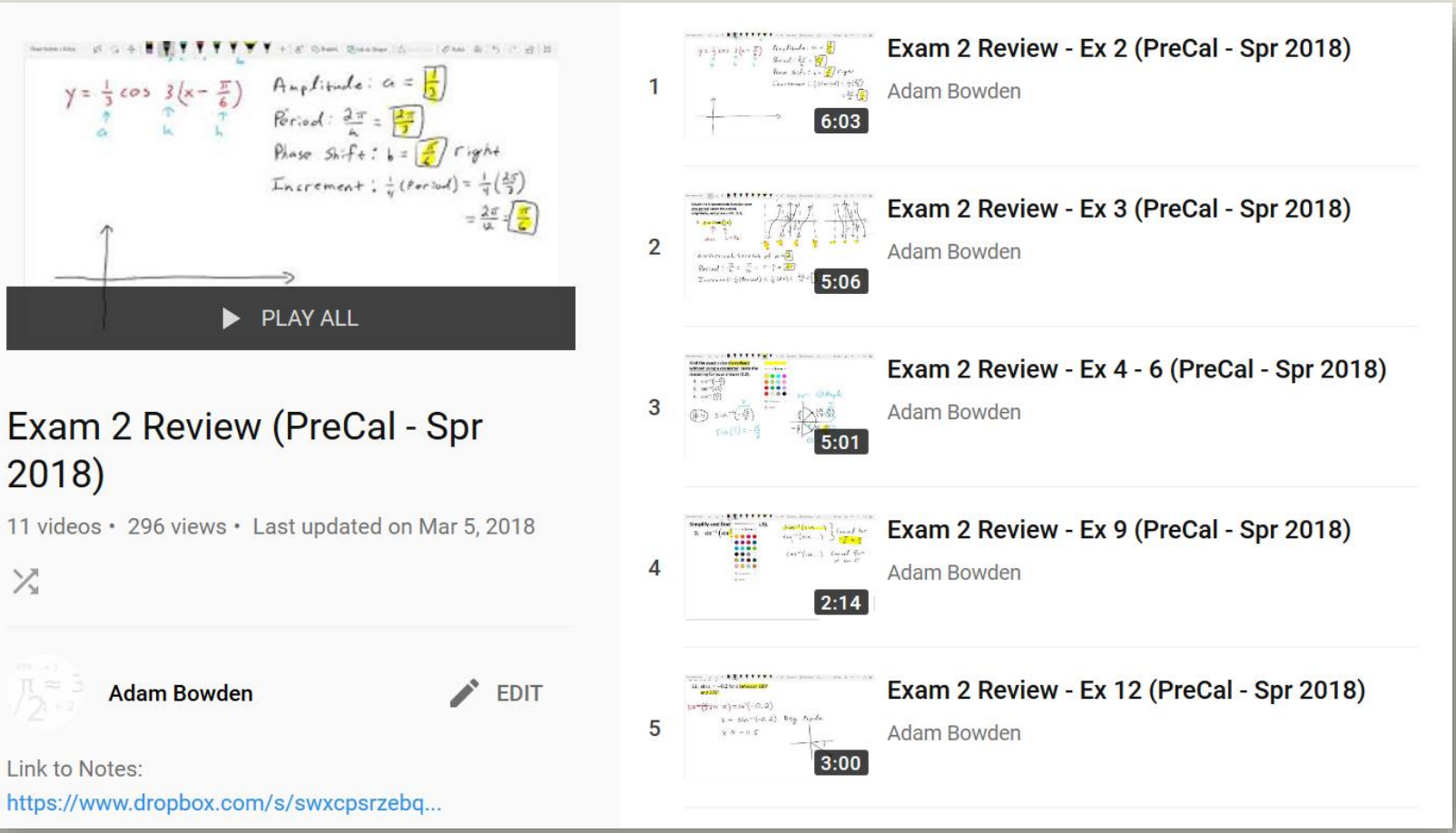
- Useful for students who are absent or would like further help
- Section Videos
  - *Some sections recorded from scratch for later review by students*
- Review Videos
  - *Posted along with paper review several days before exams*
- Class Recordings
  - *Often for days several students are absent.*
- Remote Teaching

Videos – Section Video



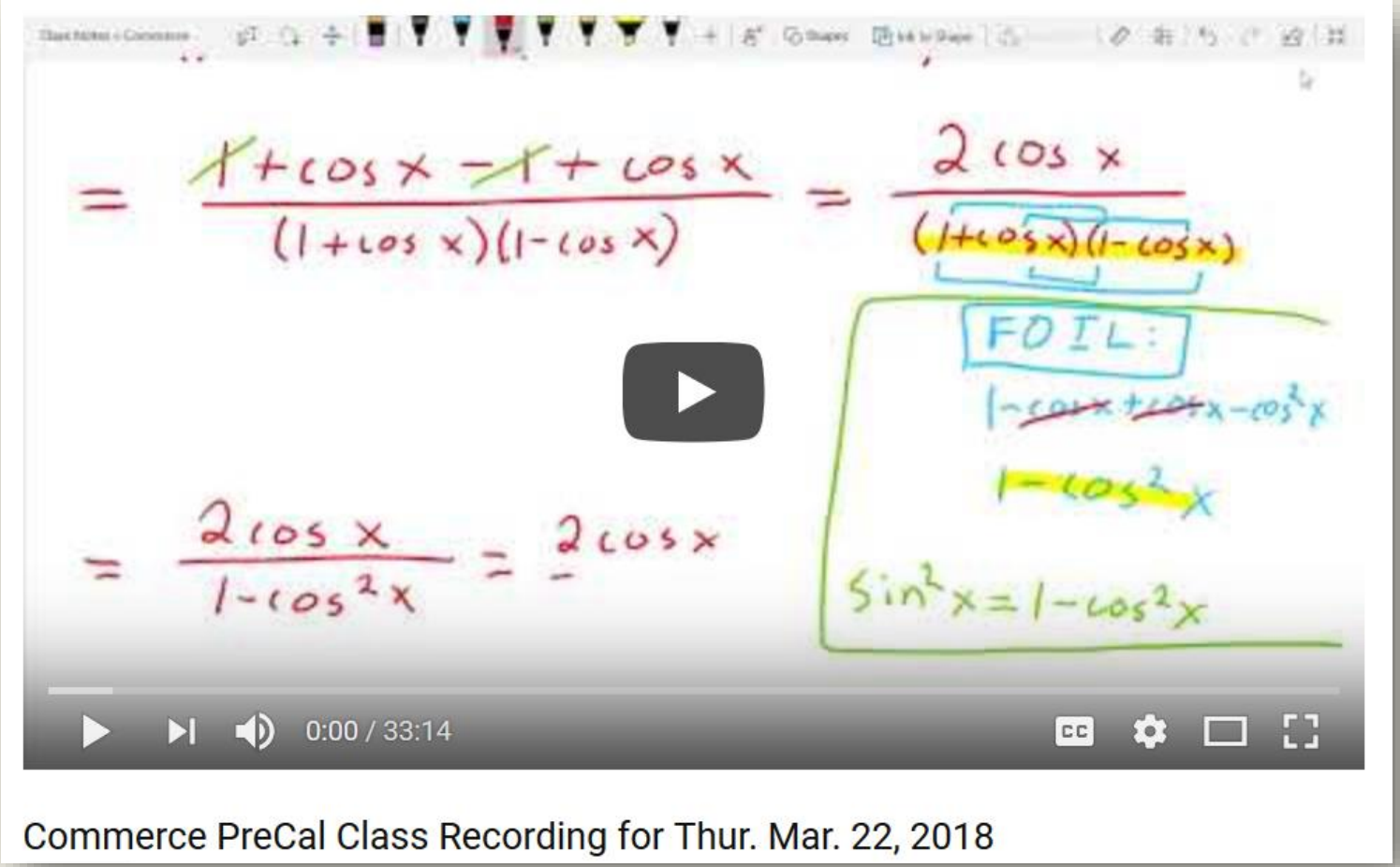
Click image to open playlist

Videos – Review Videos



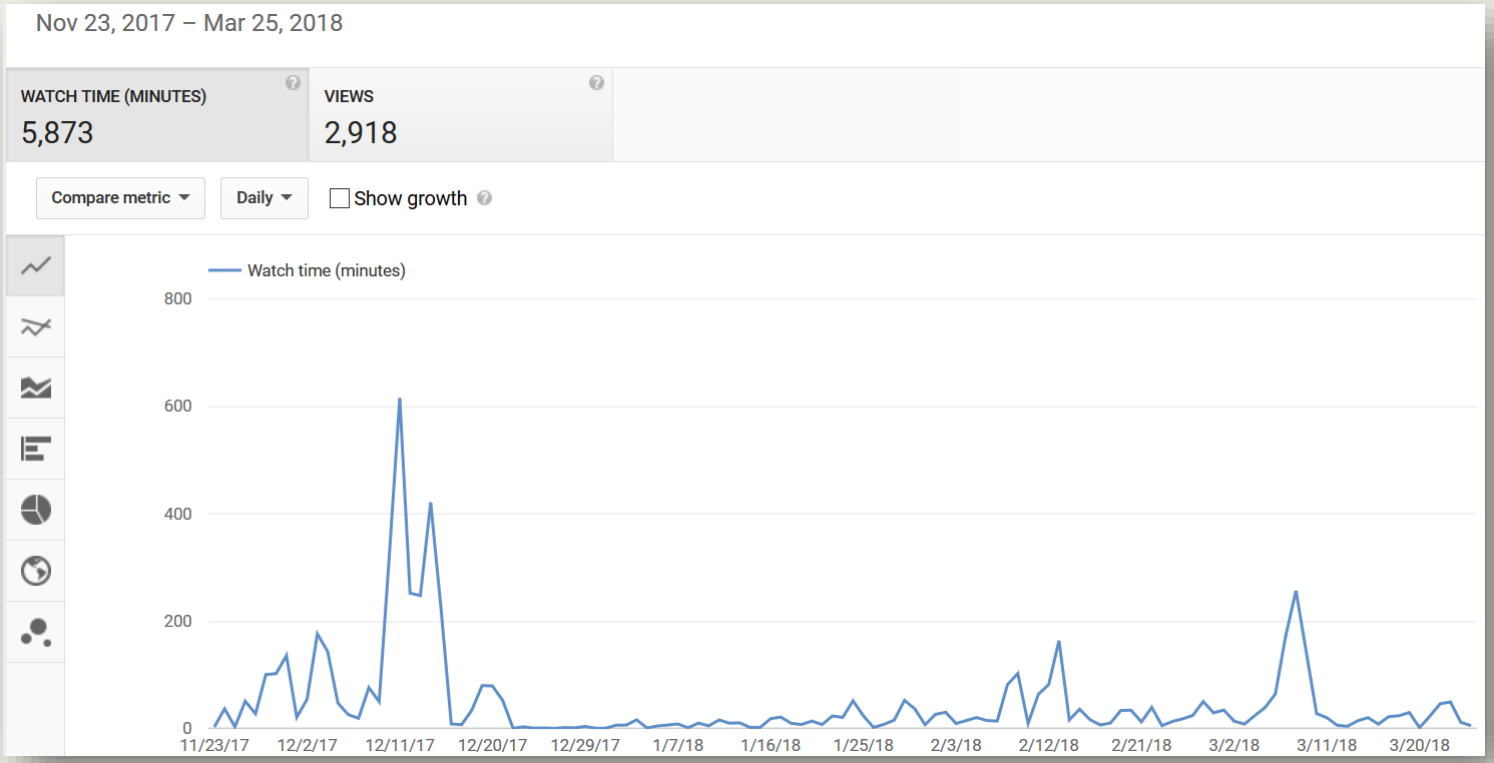
Click image to open playlist

Videos – Class Recordings

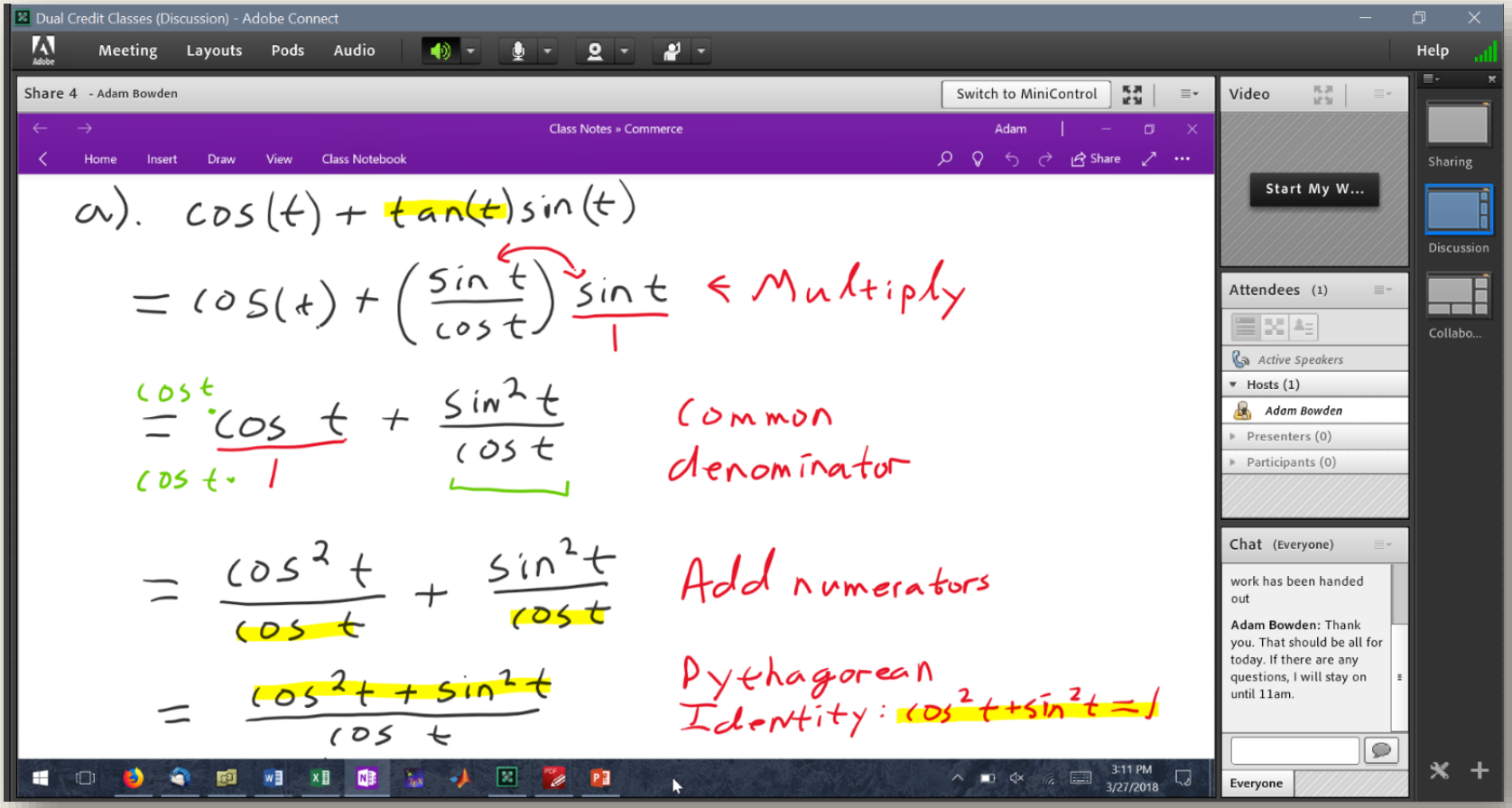


Click image to open video

Videos – Student Participation



Remote Teaching



Videos – Equipment & Software

- USB Document Camera
- Touch Screen Laptop with Active Stylus
- External Hard Drive (1 TB)
- USB Headset
- Microsoft OneNote
- Camtasia Video Editing Software
- Adobe Connect (Free for limited use)

Observations

- Students have indicated that videos help for reviewing and catching up on missed content
- Often, review videos are watched in the days leading up to and just before an exam
- Remote teaching is useful for extra examples and Q and A for days when physical presence is not possible
- Technology is a good supplement, but not replacement, for face to face time
  - *However, can help add additional contact time*

STRATEGIES

University Standards and Course Content

University Standards

- Setting Expectations
  - *Dual credit students are made aware that they are in college from the first class day*
  - *Treat the classroom as a university classroom, regardless of location*
  - *Communication with instructor via the standard university measures (for instance, university email)*
- Testing held to university criteria
  - *No make ups, retakes, or starting and completing exams later without an university approved excuse*

University Standards

- Course Content
  - *Important to compare methods and content with what is standard within the university / department*
  - *Collaborate with university instructors and/or professors as to appropriate homework and exam rigor*
  - *Departmental textbooks are often a good place to start*

Course Content

Handouts provided in order to streamline lessons

Lists common definitions, formulas, and the particular examples chosen for each section.

Section 7.3: Double-Angle Fo

$\sin 2x = 2\sin x \cos x$

$\cos 2x = \cos^2 x - \sin^2$
$= 1 - 2\sin^2 x$
$= 2\cos^2 x - 1$

1: If $\cos x = -\frac{2}{3}$ and x is in Quadrant II, find $\cos 2x$, $\sin 2$

2: Simplify the expressions $2\sin 6^\circ \cos 6^\circ$ and $2\sin 15\theta$ co

3: Write $\cos 3x$ in terms of $\cos x$.

4: Verify the identity $\sin 8x = 2\sin 4x \cos 4x$.

5: Verify the identity $\frac{\sin 3x}{\sin x \cos x} = 4\cos x - sec\, x$.

Formulas for Lowering Powers (Pow

$\sin^2 x = \frac{1-\cos 2x}{2}$ $\cos^2 x = \frac{1+\cos 2x}{2}$

6: Express $\sin^2 x \cos^2 x$ in terms of the first power of cosine.

Half-Angle Formulas

$\sin\frac{u}{2} = \pm\sqrt{\frac{1-\cos u}{2}}$ $\cos\frac{u}{2} = \pm\sqrt{\frac{1+\cos u}{2}}$ t

7: Find the exact value of $\sin 22.5^\circ$ and $\sin 112.5^\circ$.

Course Content

Handouts provided in order to streamline lessons

Helps to set standards, notetaking, and save class time

Section 7.3: Double-Angle F

$\sin 2x = 2\sin x \cos x$

$\cos 2x = \cos^2 x - \sin^2$
$= 1 - 2\sin^2 x$
$= 2\cos^2 x - 1$

1: If $\cos x = -\frac{2}{3}$ and x is in Quadrant II, find $\cos 2x$, $\sin 2$

2: Simplify the expressions $2\sin 6^\circ \cos 6^\circ$ and $2\sin 15\theta$ co

3: Write $\cos 3x$ in terms of $\cos x$.

4: Verify the identity $\sin 8x = 2\sin 4x \cos 4x$.

5: Verify the identity $\frac{\sin 3x}{\sin x \cos x} = 4\cos x - sec\, x$.

Formulas for Lowering Powers (Pow

$\sin^2 x = \frac{1-\cos 2x}{2}$ $\cos^2 x = \frac{1+\cos 2x}{2}$

6: Express $\sin^2 x \cos^2 x$ in terms of the first power of cosine.

Half-Angle Formulas

$\sin\frac{u}{2} = \pm\sqrt{\frac{1-\cos u}{2}}$ $\cos\frac{u}{2} = \pm\sqrt{\frac{1+\cos u}{2}}$ t

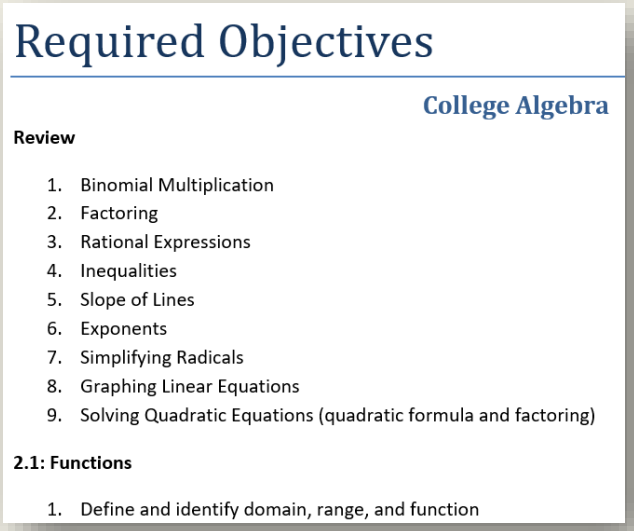
7: Find the exact value of $\sin 22.5^\circ$ and $\sin 112.5^\circ$.

STRATEGIES

Collaboration and Coordination

Collaboration and Coordination

- Maintaining consistency across high schools
  - *Some university math class are coordinated beforehand*
  - *For those that are not, materials are provided to help maintain consistency in content and rigor*



Required Objectives

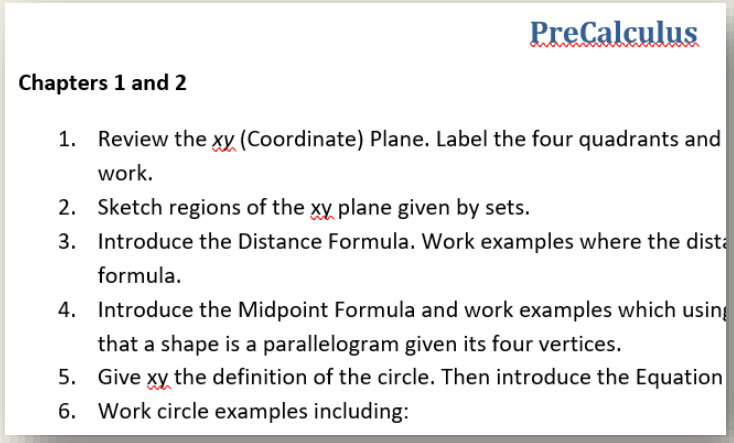
College Algebra

Review

1. Binomial Multiplication
2. Factoring
3. Rational Expressions
4. Inequalities
5. Slope of Lines
6. Exponents
7. Simplifying Radicals
8. Graphing Linear Equations
9. Solving Quadratic Equations (quadratic formula and factoring)

2.1: Functions

1. Define and identify domain, range, and function



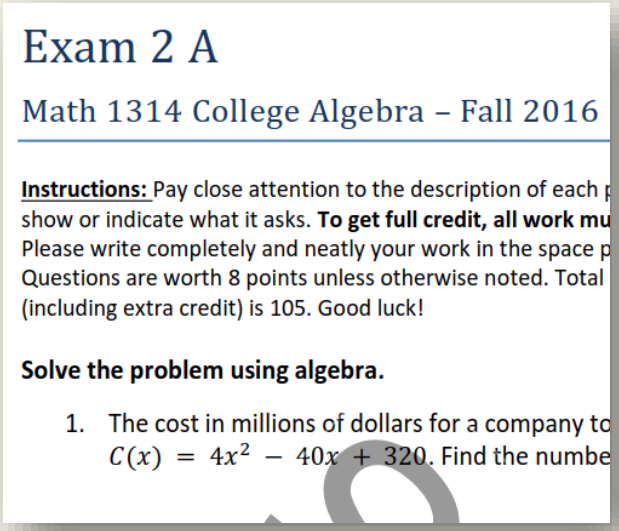
PreCalculus

Chapters 1 and 2

1. Review the *xy* (Coordinate) Plane. Label the four quadrants and work.
2. Sketch regions of the xy plane given by sets.
3. Introduce the Distance Formula. Work examples where the dista formula.
4. Introduce the Midpoint Formula and work examples which using that a shape is a parallelogram given its four vertices.
5. Give xy the definition of the circle. Then introduce the Equation
6. Work circle examples including:

Collaboration and Coordination

- Maintaining consistency across high schools
  - *Objectives intended as guidelines*
  - *Collaborate on syllabi, exams, homework, and any other aspects of the class*



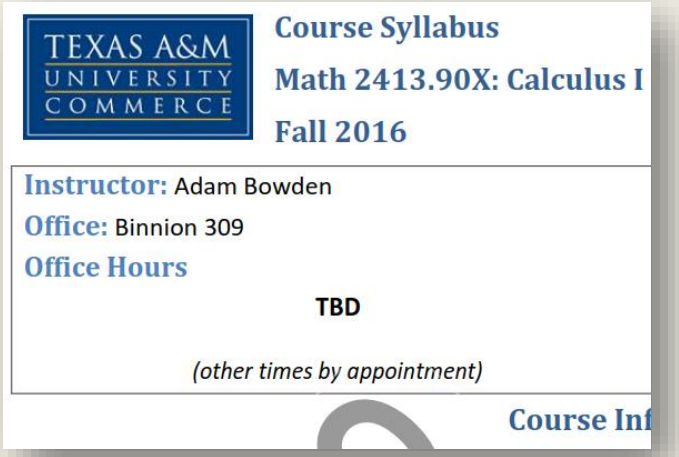
Exam 2 A

Math 1314 College Algebra – Fall 2016

Instructions: Pay close attention to the description of each p
show or indicate what it asks. **To get full credit, all work mu**
Please write completely and neatly your work in the space p
Questions are worth 8 points unless otherwise noted. Total
(including extra credit) is 105. Good luck!

Solve the problem using algebra.

1. The cost in millions of dollars for a company to
$C(x) = 4x^2 - 40x + 320$. Find the numbe



TEXAS A&M UNIVERSITY COMMERCE

Course Syllabus

Math 2413.90X: Calculus I

Fall 2016

Instructor: Adam Bowden

Office: Binnion 309

Office Hours

TBD

(other times by appointment)

Course Inf

Collaboration and Coordination

- In-service during the Summer before Fall classes
  - *Meet with university administration and discuss dual credit issues and requirements*
- Communication
  - *Weekly and/or continuous communication throughout semester*
  - *Observations for instructors teaching a class first time. For others at least once a semester*
  - *Meeting at least once during semester to discuss classes*

Collaboration and Coordination

- Building a sense of connection and collaboration
  - *Awareness of university standards*
  - *Connection to the university and each other*
  - *Sharing handouts, reviews, and projects*
  - *Willingness to assist if issues arise*

STRATEGIES

Student Success

Student Success

- Motivation
  - *Frequent emails and online announcements*
  - *Students can view progress and grades online*
  - *Scheduled office hours on location. Students encouraged to attend.*
  - *Special study sessions scheduled as needed*

Student Success

Handouts and Test Reviews

- *Posted online along with handouts*
- *Review handed out at least a week before exam.*
- *In some cases, limited extra credit given for turning in worked out review*

142 Exam 2 Review

the trigonometric function over eriod. State the period, itude, and phase shift. (5.3).

$y = \sin\left(\frac{1}{2}x + \frac{\pi}{3}\right)$

$y = \frac{1}{3}\cos\left(3x - \frac{\pi}{2}\right)$

$y = 2\tan\left(\frac{1}{2}x\right)$

he exact value (in radians) ut using a calculator. State the ning for your answer (5.5).

$\sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

$\tan^{-1}(\sqrt{3})$

$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

$\tan^{-1}(-1)$

$\cos^{-1}\left(-\frac{1}{2}\right)$

ify and find the value (5.5).

$\sin^{-1}\left(\sin\frac{3\pi}{4}\right)$

$\cos^{-1}\left(\cos\frac{7\pi}{6}\right)$

the trig equations (6.4).

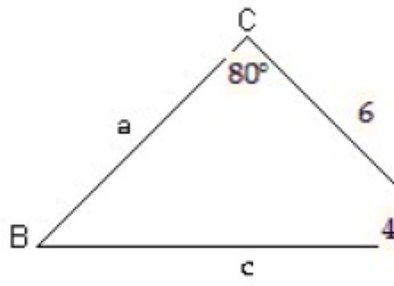
$\cos x = -\frac{1}{2}$ for x between 90° and 180°

$\sin x = -0.2$ for x between 180° and 270°

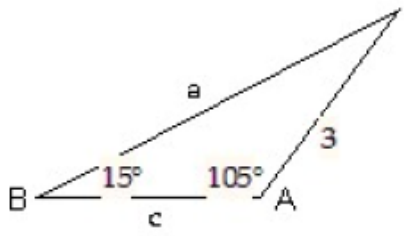
the problem by using triangles

Solve the triangle (Section 6.5 –

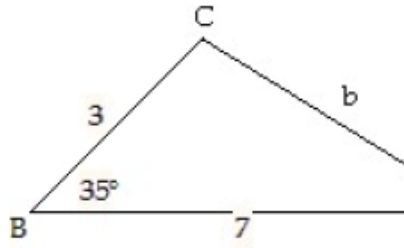
15.



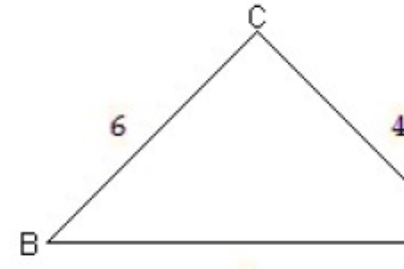
16.



17.



18.



Student Success

- Communication
  - *Maintain communication with high school councilors*
  - *Flexible availability for students through office hours, email, or online office arrangements*
  - *Videos also aid in communicating information outside the classroom*
- Interventions
  - *At risk student are identified at various times in the semester for tutoring or other ways to help*
  - *Councilors also important in reaching students at risk*

Student Success

- Pass Rates for the last two years
  - *93.5% in Fall 2015 (108 Students)*
  - *97.9% in Spring 2016 (91 Students)*
  - *95.8% in Fall 2016 (199 Students)*
  - *99.3% in Spring 2017 (143 Students)*
  - *97.7% in Fall 2017 (171 Students)*

Conclusion

- Efforts for insuring student success has helped maintain good pass rates over the last five semesters
  - *This covers students in up to five schools in the region*
- Improving student access to content appears successful for helping understanding and managing contact time
- Coordination between schools has maintained a sense of cohesion and collaboration

Contact

Email: Adam.Bowden@tamuc.edu

Web: *sites.google.com/site/abowdentamuc*

Thank you for your participation!