PREDICTING ACADEMIC SUCCESS IN INITIAL MATH COURSES TAKEN BY FIRST-TIME FRESHMEN:

Analysis and Implementing a Solution

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THE STRUCTURE OF THE WEBINAR:

- A description of the problem
- The predictive model created
- Implementing the model
- Evaluating the model
- Questions

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The Problem of First-Year Math

- Success Rates
- Assessment Methodologies
- Costs
- On-Boarding Challenges

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ANALYZING OUR ASSESSMENT TOOL AND CREATING A PREDICTIVE MODEL

- The recipe for MOM
- The statistical models used
- Evaluating the accuracy of our former tool
- Evaluating the accuracy of MOM

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The Recipe for MOM

- MOM
  - $\text{Probability}(\text{DFW}|\text{x}\beta) = \frac{\exp(x\beta)}{1+\exp(x\beta)}$
  - Model: $x\beta = \beta_0 + \beta_1 * \text{PredRet} + \beta_2 * \text{MathACT} + \beta_3 * \text{Class}$
  - $x\beta$ = 8.4113 + (-0.0656)*PredRet + (-0.1633)*MathACT + β_3*Class
- The Parts of MOM
  - PredRet
  - Max Math ACT/SAT
  - Class Rigor Index

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What is PredRet?

- Pr(Here) = B_1(HS GPA) + B_2(ACT)+ B_3(HS Class Size) + B_4(proxy for rigor) + B_5 (application date) + e
- The Parts of PredRet
- The Accuracy of Predret

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Data-Based Decision Making

- Three Key Questions
  - *What data do you have?*
  - *When do you have it?*
  - *What can you use it for?*
- Choosing a Model
  - *What do we want in a model?*
  - *Retention research: Logistic Regression*

$$\text{Prob}(y=1 \mid z) = \frac{\exp(z)}{1 + \exp(z)}$$

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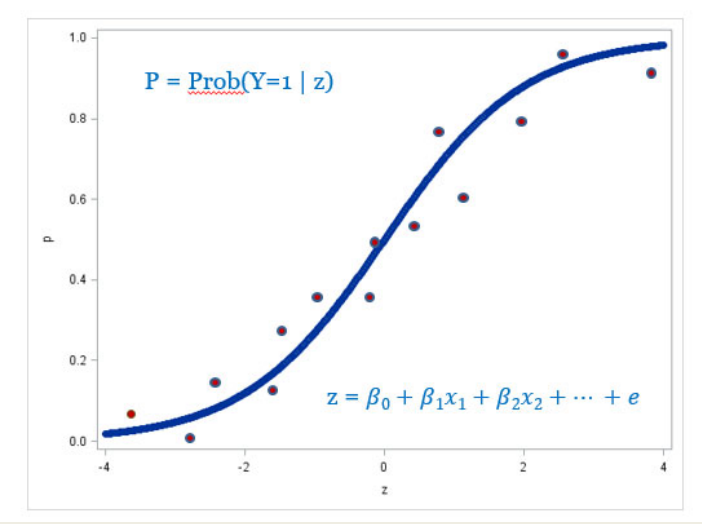
Data-Based Decision Making



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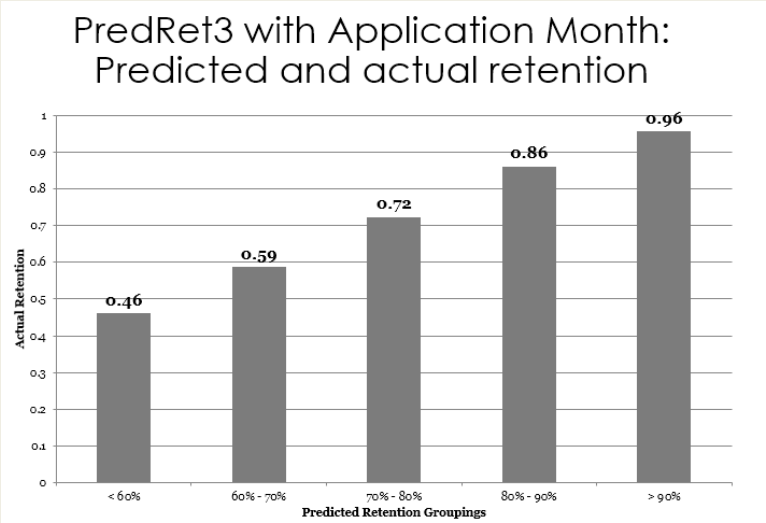
Data-Based Decision Making



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How Do We Know Our Models Work?

- Incrementalism
- Satisficing
- Binning and Goodness-of-Fit Tests
- ROC Analysis

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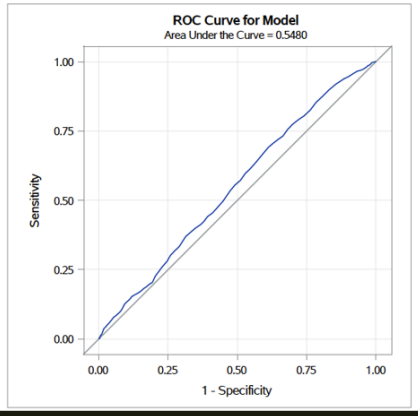
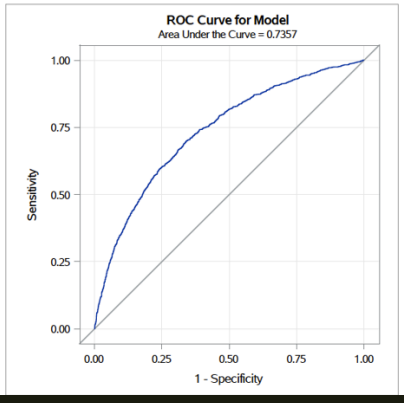
Proc logistic
DFW = MPTest



Proc logistic
DFW = PredRet-Math ACT-Class



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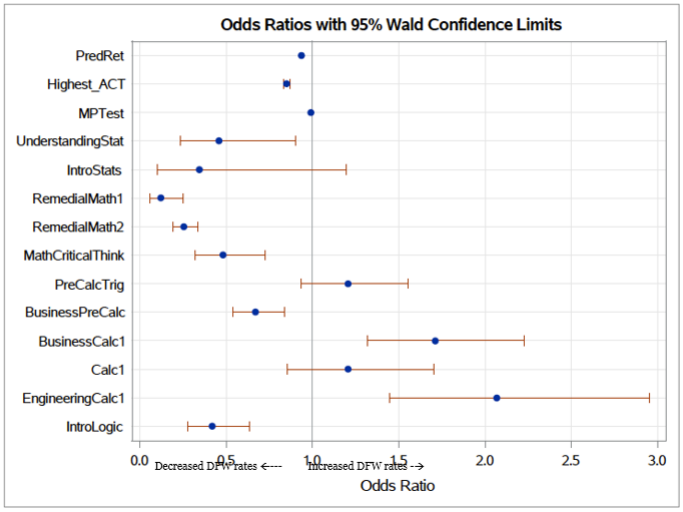
Odds ratios and DFW rates using College Algebra as the baseline



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IMPLEMENTING THE MODEL

- Who would and would not get an offer?
  - *Data missing*
  - *Projected DFW*
- When did they get it and what information did they receive?
- What if someone did not like their offer?
- Coordinating IT/Admissions & Recruitment/Advising

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Evaluating the Effectiveness of the Model

- Wins
  - Student success
  - Savings (direct and indirect)
  - Student onboarding
  - Reduction in frustrations
  - Getting people into one-and-done math courses

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Evaluating the Effectiveness of the Model

- Challenges
  - Improvement but not at levels expected
  - Changing class rigor
  - High school experience
  - Departmental resistance
  - Do we retrain the model?

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QUESTIONS?

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