**Harold’s Fundamental Theorems of Calculus**

**“Cheat Sheet”**

17 October 2020

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| **Formulas** | **Examples** |
| **1) The First Fundamental Theorem of Calculus: Integrating Derivatives** | 1) Solve |
| **2) The Second Fundamental Theorem of Calculus: Differentiating Integrals**Simple FormulaGeneral FormulaHow to find the area under a curve? | StudyPug | 2) Solve2nd FToC General FormulaDetermine functionsSubstituteDifferentiatePlug them back into the formulaSimplify |
| **Second FTC** **Proof #1** | **Second FTC Proof #2** |
| Proof of the Second Fundamental Theorem of Calculus :a) Break integral into two partsb) Change boundsc) Apply the First Fundamantal Theorem of Calculusd) Take the derivativee) Use the derivative chain rulef) Using the Second Fundamantal Theorem of Calculus we see that and .g) This completes the proof of the general formula. | Proof of the Second Fundamental Theorem of Calculus :a) Apply the First Fundamantal Theorem of Calculusb) Distributec) Chain ruled) Simplifye) Substitute |
| Formulas used in the proofs:Equivalent NotationChange of BoundsDerivative Chain Rule |