**Lecture**

Proving Trigonometry Formulas from Euler’s Formula (Lee Stemkoski)

|  |  |  |
| --- | --- | --- |
|  | **Topic** | **Score (0/1)** |
|  | Proving trigonometric formulas using Euler’s formula |  |
| 1 | Proof of |  |
| 2 | Euler’s formula: |  |
| 3 |  |  |
| 4 |  |  |
|  | cos is even function: cos(x) = cos(-x) |  |
|  | sin is odd function: sin(x) = -sin(x) |  |
| 5 | Proof of angle sum formula |  |
| 6 |  |  |
| 7 |  |  |
| 10 |  |  |
| 11 | If two complex numbers are equal, their real and their imaginary parts must also be equal |  |
| 12 |  |  |
| 13 |  |  |
| 14 | Double angle formulas |  |
| 15 |  |  |
| 16 |  |  |
| 17 |  |  |

**Total Score**

**Lecture**

Moment Method Estimation (Machine Intelligence Wiki)

|  |  |  |
| --- | --- | --- |
|  | **Topic** | **Score (0/1)** |
|  | Deriving estimators of the parameters of uniform distribution using the method of moments |  |
| 1 | Uniform distribution |  |
| 2 | Bounds of variable x |  |
| 3 | First two moments based on PDF |  |
| 3-1 | Expectation of x |  |
| 3-2 |  |  |
|  |  |  |
| 3-3 | Second moment |  |
| 3-4 |  |  |
| 3-5 |  |  |
| 3-6 |  |  |
| 4 | Sample moment (mean) |  |
| 4-1 |  |  |
| 5 | Sample second moment |  |
| 5-1 |  |  |
| 6 | Expectation of x equal to sample mean |  |
| 6-1 |  |  |
| 7 | Expectation of x2 equal to sample second moment |  |
| 7-1 |  |  |
| 8 | Solve for a and b |  |
| 8-1 |  |  |
| 8-2 | Estimator of a |  |
| 8-3 |  |  |
| 8-4 | Plug in to the equation |  |
| 8-5 |  |  |
| 8-6 |  |  |
| 8-7 |  |  |
| 8-8 | Solve Quadratic equation in b |  |
| 8-9 | Estimator of b |  |
| 8-10 |  |  |
| 9 | Plug in to b to equation |  |
| 9-1 |  |  |
| 10 | is variance of the sample |  |
| 11 | Uniform distribution variable should be random |  |
| 12 | Estimator parameters a and b are linear combinations of mean and standard deviation of the sample |  |
| 12-1 |  |  |
| 12-3 |  |  |

**Total Score**

**Lecture**

Fundamental Theorem of Calculus (Khan Acadmey)

|  |  |  |
| --- | --- | --- |
|  | **Topic** | **Score (0/1)** |
|  | Connection between definite integrals and derivatives |  |
| 1 | Say we have a continuous function f on interval [a, b] |  |
| 1-1 | Closed interval that includes a and b |  |
| 2 | Graph of function |  |
| 2-1 | Lower bound a on graph |  |
| 2-2 | Upper bound b on graph |  |
| 3 | Define a new function that’s the area under the curve between a and some point in our interval |  |
| 3-1 | Pick a point, x in interval [a,b] |  |
| 4 | Denote area under curve between two end points with integral |  |
| 4-1 |  |  |
| 4-2 | This is also a function of x, F(x) |  |
| 5 | Fundamental theorem of calculus |  |
| 5-1 |  |  |
| 5-2 | Every continuous function f has an antiderivative F(x) |  |
| 5-3 | Connection between derivative / integration |  |
| 5-4 | Taking the definite integral is essentially taking an antiderivative |  |
| 6 | Example of applying fundamental theorem of calculus |  |
| 6-1 | Find derivative of the integral of crazy looking expression |  |
| 6-2 |  |  |
| 6-3 |  |  |
| 6-4 | Replace t with x |  |
| 6-5 | Solution becomes f(x) instead of f(t) |  |
| 6-6 |  |  |
| 7 | It does not matter what the lower boundary is. |  |
| 8 | Introduction about next videos |  |
| 9 | Next videos will talk about intuition and more examples using fundamental theorem of calculus |  |

**Total Score**