Roll No:

Date:

Formative assessment 5
ME-781, Aug 22, 2023

Max Marks: 10, Total time: 15 minutes

- No explanation for any question would be provided.
- Please make any assumptions as you see fit and solve the questions.
- This is an open-notes exam.
- You need not derive anything from scratch if it was derived in the class.
- You are not allowed to use a computer or calculator.

3x2

1. Let x and y be independent random variables with uniform distribution in [0, 1] and [-½ , ½] respectively. Find value of
   a. $E(x^2)$

$$\int_0^1 x^2 dx = 1/3$$

   b. $E(y^2)$

$$\int_{-1/2}^{1/2} y^2 dy = 1/12$$

   c. $E(x - y)$

$$E(x-y) = E(x)-E(y) = 1/2 - 0 = 1/2$$

2x2

2. Find the volume and surface area of a n-dimensional circular cylinder of radius r and height h in terms of V(d) and A(d), when V(n) and A(n) are the volume and surface area of n-dimensional balls of unit radius.

Volume of a n-dimensional circular cylinder of radius r and height h should be

$$V_{cyl}(r, h, \boldsymbol{d}) = r^{\boldsymbol{d}-1}.V(\boldsymbol{d}-1).h$$

And the area $A_{cly}(r, h, \boldsymbol{d})$ would be

$$A_{cly}(r, h, \boldsymbol{d}) = 2.r^{\boldsymbol{d}-1}V(\boldsymbol{d}-1) + h.r^{\boldsymbol{d}-2}A(\boldsymbol{d}-2)$$