STAT 347 HW6

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4.42 $\frac{\theta_1+\theta_2}{2}$

4.43 $E(A) = E(\pi r^2) = \pi E(r^2) = \pi \int_0^1 r^2 dr = \frac{\pi}{3}$

4.58

- **a** $0.54776 - 0.5 = 0.04776$
- **b** $0.5 - 0.46414 = 0.03586$
- **c** $0.94062 - 0.61791 = 0.32271$

4.59

- **a** 0
- **b** 1.10
- **c** 1.64
- **c** 2.58

4.71

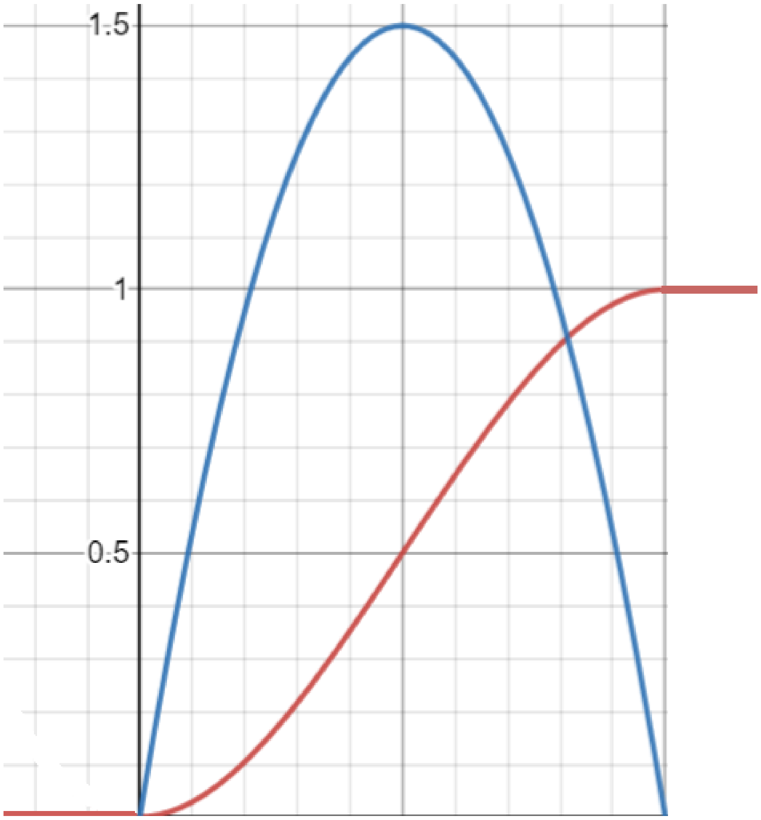
- **a** $(0.12 - 0.13)/0.005 = -2.00$, $P(-2 < Z < 2) = 0.9545$
- **b** $0.9545^4 = 0.8300$

4.89 $\beta = \frac{1}{\lambda}$

- **a** $P(Y > 2) = \int_2^\infty \frac{1}{\beta} e^{\frac{-x}{\beta}} dx = -e^{\frac{-x}{\beta}}|_2^\infty = e^{-\frac{2}{\beta}} = 0.0821 \implies \beta = 0.8 = E(Y)$
- **b** $\lambda = \frac{1}{0.8} = 1.25$, $P(Y < 1.7) = \int_0^{1.7} 1.25e^{-1.25x} dx = -e^{-1.25x}|_0^{1.7} = 0.8806$

4.126

- **a** $\int_0^y 6t - 6t^2 dt = 3t^2 - 2t^3|_0^y = 3y^2 - 2y^3$ for $y \in [0, 1]$, 0 for $y < 0$, 1 for $y > 1$



b

c $F(0.8) - F(0.5) = 0.896 - 0.5 = 0.396$

4.144 **a** This is the standard normal distribution. $k = \frac{1}{\sqrt{2\pi}}$

b

$$\begin{aligned} m_y(t) = E(e^{tY}) &= \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{yt} e^{\frac{-y^2}{2}} dy \\ &= \int_{-\infty}^{\infty} e^{\frac{-y^2}{2}+yt} dy \\ &= \int_{-\infty}^{\infty} e^{\frac{-y^2}{2}+yt-\frac{t^2}{2}+\frac{t^2}{2}} dy \\ &= \int_{-\infty}^{\infty} e^{\frac{1}{2}(z-t)^2} e^{\frac{t^2}{2}} dy \\ &= e^{\frac{t^2}{2}} \int_{-\infty}^{\infty} e^{\frac{1}{2}(z-t)^2} dy \\ &= e^{\frac{t^2}{2}}(1) \end{aligned}$$

c Since this is standard normal, mean is 0 and variance is 1.