- 11. [8 points] The parts of this problem are unrelated. No justification is required for your answers.
  - **a.** [2 points] Let p(x) be a probability density function (pdf). Then, which of the following functions must also be probability density function? Circle **all** options which apply.
    - i. 2p(x)iv.  $2x p(x^2)$ ii. p(2x)v.  $3x^2 p(x^3)$ iii. 2p(2x)vi. NONE OF THESE
  - **b.** [2 points] The cartesian coordinates of a point A are  $(x, y) = (\sqrt{2}, -\sqrt{2})$ . Which of the following represent the polar coordinates of point A? Circle **all** options which apply.
    - i.  $(r, \theta) = \left(\sqrt{2}, -\frac{\pi}{4}\right)$ ii.  $(r, \theta) = \left(2, -\frac{\pi}{4}\right)$ iii.  $(r, \theta) = \left(2, -\frac{\pi}{4}\right)$ iv.  $(r, \theta) = \left(-2, \frac{\pi}{4}\right)$ v.  $(r, \theta) = \left(-2, \frac{3\pi}{4}\right)$ vi. NONE OF THESE
  - c. [2 points] A power series  $\sum_{n=0}^{\infty} C_n (x-a)^n$  converges at x = -4 and diverges at x = 2. Which of the following values could be the center, a, of the power series? Circle **all** options which apply.
    - i. a = -2ii. a = -1iii. a = 0iv. a = 1v. a = 2vi. NONE OF THESE
  - **d**. [2 points] At which of the following values of  $\theta$  in  $[0, \pi)$  does the curve  $r = \cos(\theta)$  have a horizontal tangent line? Circle **all** options which apply.
    - i.  $\theta = 0$  iv.  $\theta = \frac{\pi}{2}$
    - ii.  $\theta = \frac{\pi}{4}$  v.  $\theta = \frac{3\pi}{4}$
    - iii.  $\theta = \frac{\pi}{3}$  vi. None of these