2pts per problem. Show your work.

Problem 1: Find polar coordinates for the point $(-3, 5)$. Use degrees for the angle please.

Problem 2: Find polar coordinates r, θ for the point $(4, -4)$ such that $r < 0$. Use degrees for θ.

Problem 3: Given $z = 3\sqrt{2}e^{i\pi/4}$ and $w = 2i$ calculate the Cartesian form and polar form of zw.

Problem 4: Let $z = 1 - i\sqrt{3}$. Calculate the Cartesian and polar form of z^5.

Problem 5: Calculate $\sqrt[3]{2-2i}$ and the set of values $(2-2i)^{1/3}$

Problem 6: Factor $z^3 - 2 + 2i$ completely over $\mathbb{C}$.

Problem 7: Derive $\cos(2x)\sin(3x) = \dfrac{1}{2}\sin(x) + \dfrac{1}{2}\sin(5x)$ by using the algebra of the imaginary exponentials and the identities $\cos\theta = \frac{1}{2}(e^{i\theta} + e^{-i\theta})$ and $\sin\theta = \frac{1}{2}(e^{i\theta} - e^{-i\theta})$

Problem 8: Find the Cartesian form of the polar equation $r^2 = 4r\sin\theta$.

Problem 9: Find the polar form of the equation $y = 2x + 3$. Please solve for r as a function of θ.

Problem 10: Classify the following polar equations, use the textbook and/or Desmos to find the graph and make a sketch of the shape. Name each curve.

(a.) $r = 1 + 2\cos\theta$

(b.) $r = 3 + 3\sin\theta$

(c.) $r = \sin(4\theta)$