HW #10 Name: _____
STAT 2023

1. Let Z represent the standard normal random variable. (draw the corresponding pictures)

A) Find $P(Z < .90)$

B) Find $P(Z < 0)$

C) Find $P(Z > 1.2)$

D) Find $P(.1 < Z < 2.17)$

E) If $P(Z < z) = .67$, find z

F) If $P(-z < Z < z) = .95$, find z

2. Let X represent a random variable with a normal distribution having mean $\mu = 40$ and standard deviation $\sigma = 6$.

A) Find $P(X < 40)$

B) Find $P(X < 46)$

C) Find $P(X < 20)$

D) Find $P(X > 50)$

E) Find $P(30 < X < 35)$

F) If $P(X < x) = .75$, find x

3. A brewery has a dispensing machine that fills thousands of 16-ounce beer cans each day. The machine is very consistent but the pours do vary a little bit. Assume the distribution for the amount of beer dispensed by the machine follows a normal distribution with mean of 16.1 ounces per can and a standard deviation of 0.1 ounces.

   A) What proportion of the cans contain less than 16 ounces of beer?

   B) The cans hold a maximum of 16.25 ounces of beer. If a can is overfilled it cannot be properly sealed and must be identified before hand. Find the proportion of cans that are overfilled by the dispensing machine.

4. The oxygen dissolved in rivers and streams is important for maintaining the ecosystem in the water. A dissolved oxygen content of less than 5 milligrams per milliliter (mg/ml) of water is undesirable because it is unlikely to support aquatic life. Suppose an industrial plant discharges waste into a river, and the downstream daily oxygen content measurements are normally distributed with a mean of 6.3 mg/ml and a standard deviation of 0.6 mg/ml. What percentage of days would the dissolved oxygen content in the river be considered undesirable?

5. The length of human pregnancies from conception to birth varies according to a distribution that is approximately normal with a mean of 266 days and a standard deviation of 16 days. How long do the longest 5% of pregnancies last?

6. The annual rate of return on stock indexes (which combine many individual stocks) is approximately normal. Since 1945, the Standard & Poor's 500 index has a mean yearly return of 12%, with a standard deviation of 16.5%. In what range do the middle 90% of all yearly returns lie?