MATH 104 Module 3 Exam   Name: _____

1. (6 pts) Suppose X is a continuous random variable. If $P(X < @a@) = @c@$ and $P(X < @b@) = @d@$, then:

   a. $P(X > @a@) = 1 - @c@ = @round(1 - c, 2)@$

   b. $P(X > @b@) = 1 - @d@ = @round(1 - d, 2)@$

   c. $P(@a@ < X < @b@) = @d@ - @c@ = @round(d - c, 2)@$

2. (4 pts) Factor the polynomial $@latex(poly)@$. $@latex(poly)@ = @f'(latex(fact0))(latex(fact1))'@$

2. (4 pts) Given the uniform distribution below, find the probability of the shaded region. Give your answer as a decimal or fraction.

3. (6 pts) Evaluate the following probabilities based on the standard normal distribution. Round all answers to at least three decimal places.

   a. $P(z < @a@) = \text{normalcdf}(-E99, @a@) = @sol_a@$

   b. $P(z > @b@) = \text{normalcdf}(@b@, \infty) = @sol_b@$

   c. $P(@c@ < z < @d@) = \text{normalcdf}(@c@, @d@) = @sol_c@$

4. (4 pts) Find the area of the shaded region under the standard normal distribution between the given z-scores. Round your answer to three decimal places. $P(-1.63 < z < 2.29) =$

5. (4 pts) Use technology to calculate the following probability for a t-distribution with 10 degrees of freedom. Answer with at least three decimal places.

$P(t \geq -1.28) =$

6. (6 pts) A population of values has a normal distribution with $\mu = 163.1$ and $\sigma = 74$. You intend to draw a random sample of size $n = 102$.

What is the mean of the distribution of sample means? Round to one decimal place.

$\mu_{\bar{x}} =$

What is the standard deviation of the distribution of sample means? Round to two decimal places.

$\sigma_{\bar{x}} =$

7. (6 pts) A particular fruit's weights are normally distributed, with a mean of 701 grams and a standard deviation of 39 grams. If you pick one fruit at random, what is the probability that it will weigh between 618 grams and 697 grams. Round your answer to three decimal places.

8. (6 pts) A particular fruit's weights are normally distributed, with a mean of 783 grams and a standard deviation of 38 grams. The heaviest 17% of fruits weigh more than how many grams? Give your answer to the nearest gram.

9. (6 pts) A distribution of values is normal with a mean of 147.4 and a standard deviation of 24.4. Answer the following to the nearest tenth. Find P_{78}, which is the score separating the bottom 78% from the top 22%.

$P_{78} =$

10. (6 pts) A manufacturer knows that their items have a normally distributed lifespan, with a mean of 6.7 years, and standard deviation of 1.4 years. If you randomly purchase 15 items, what is the probability that their mean life will be longer than 6 years?

11. (8 pts) In the country of United States of Heightlandia, the height measurements of ten-year-old children are approximately normally distributed with a mean of 56.6 inches, and standard deviation of 8.9 inches.

Answer the following, rounding your answers to three decimal places where necessary.

   a. What is the probability that a randomly chosen child has a height of **less** than 36.95 inches?

   b. What is the probability that a randomly chosen child has a height of **more** than 44.4 inches?

12. (12 pts) A population of values has a normal distribution with $\mu = 240.7$ and $\sigma = 38.1$. You intend to draw a random sample of size $n = 109$.
Answer the following, rounding to three decimal places where appropriate.

   a. Find the probability that a single randomly selected value is greater than 240.3.
      $P(X > 240.3) =$

   b. Find the probability that a sample of size $n = 109$ is randomly selected with a mean greater than 240.3.
      $P(\bar{X} > 240.3) =$

Key - Form A

1. 0.9 ˜ 0.76 ˜ 0.14
2. $\frac{2}{9}$
3. 0.011 ˜ 0.732 ˜ 0.823
4. 0.937
5. 0.885
6. 163.1 ˜ 7.33
7. 0.442 or 0.444
8. 819
9. 166.2
10. 0.9736 or 0.9738
11. 0.014 ˜ 0.915
12. 0.504 ˜ 0.544