Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

1. **X is Uniform(0,17) and Y=X^2. Write the support and full piecewise CDF and PDF of Y.**

Reference: On nonnegative support, x maps monotonically to x^2 and the inverse is sqrt(y).

2. **X is Uniform(0,18) and Y=3X+0. Write the support and full piecewise CDF and PDF of Y.**

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

3. **X is Uniform(0,2) and Y=-4X+1. Write the support and full piecewise CDF and PDF of Y.**

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

4. **X is Uniform(-3,3) and Y=X^2. Write the support and full piecewise CDF and PDF of Y, accounting for both preimages.**

Reference: For 0<y<upper^2, the event X^2<=y is -sqrt(y)<=X<=sqrt(y); both inverse branches contribute to the density.

State the model or rule, show exact setup, then round only the final decimal.

Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

5. **X is Uniform(0,16) and Y=sqrt(X). Write the support and full piecewise CDF and PDF of Y.**

Reference: The inverse is x=y^2. Differentiate F_X(y^2) on the transformed support.

6. **X is Uniform(0,25) and Y=sqrt(X). Write the support and full piecewise CDF and PDF of Y.**

Reference: The inverse is x=y^2. Differentiate F_X(y^2) on the transformed support.

Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

7. **X is Uniform(-6,6) and Y=X^2. Write the support and full piecewise CDF and PDF of Y, accounting for both preimages.**

Reference: For 0<y<upper^2, the event X^2<=y is -sqrt(y)<=X<=sqrt(y); both inverse branches contribute to the density.

8. **X is Uniform(0,7) and Y=-3X+1. Write the support and full piecewise CDF and PDF of Y.**

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Worked Answer Key

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

1. **X is Uniform(0,17) and Y=X^2. Write the support and full piecewise CDF and PDF of Y.**

Reference: On nonnegative support, x maps monotonically to x^2 and the inverse is sqrt(y).

Answer: support [0,289]

1. F_Y(y)=0 for y<0; F_Y(y)=sqrt(y)/17 for 0<=y<=289; F_Y(y)=1 above 289.
2. f_Y(y)=1/(2(17)sqrt(y)) for 0<y<289, and 0 otherwise.

2. **X is Uniform(0,18) and Y=3X+0. Write the support and full piecewise CDF and PDF of Y.**

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

Answer: support [0,54]

1. F_Y(y)=0 for y<0; F_Y(y)=(y-0)/54 for 0<=y<=54; F_Y(y)=1 for y>54.
2. f_Y(y)=1/54 for 0<y<54, and 0 otherwise.

Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Worked Answer Key

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

3. **X is Uniform(0,2) and Y=-4X+1. Write the support and full piecewise CDF and PDF of Y.**

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

Answer: support [-7,1]

1. F_Y(y)=0 for y<-7; F_Y(y)=(y+7)/8 for -7<=y<=1; F_Y(y)=1 for y>1.
2. f_Y(y)=1/8 for -7<y<1, and 0 otherwise.

4. **X is Uniform(-3,3) and Y=X^2. Write the support and full piecewise CDF and PDF of Y, accounting for both preimages.**

Reference: For 0<y<upper^2, the event X^2<=y is -sqrt(y)<=X<=sqrt(y); both inverse branches contribute to the density.

Answer: support [0,9]

1. F_Y(y)=0 for y<0; F_Y(y)=sqrt(y)/3 for 0<=y<=9; F_Y(y)=1 above 9.
2. f_Y(y)=1/(2(3)sqrt(y)) for 0<y<9, and 0 otherwise. The two 1/(2sqrt(y)) Jacobian contributions combine.

Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Worked Answer Key

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

5. **X is Uniform(0,16) and Y=sqrt(X). Write the support and full piecewise CDF and PDF of Y.**

Reference: The inverse is x=y^2. Differentiate F_X(y^2) on the transformed support.

Answer: support [0,4]

1. F_Y(y)=0 for y<0; F_Y(y)=y^2/16 for 0<=y<=4; F_Y(y)=1 for y>4.
2. f_Y(y)=2y/16 for 0<y<4, and 0 otherwise.

6. **X is Uniform(0,25) and Y=sqrt(X). Write the support and full piecewise CDF and PDF of Y.**

Reference: The inverse is x=y^2. Differentiate F_X(y^2) on the transformed support.

Answer: support [0,5]

1. F_Y(y)=0 for y<0; F_Y(y)=y^2/25 for 0<=y<=5; F_Y(y)=1 for y>5.
2. f_Y(y)=2y/25 for 0<y<5, and 0 otherwise.

Name _____ Score _____ Teacher _____ Date _____

Continuous Random Variable Transformations

Worked Answer Key

Write the transformed support, full piecewise CDF, and PDF. Account for decreasing maps and every valid preimage.

7. **X is Uniform(-6,6) and Y=X^2. Write the support and full piecewise CDF and PDF of Y, accounting for both preimages.**

Reference: For 0<y<upper^2, the event X^2<=y is -sqrt(y)<=X<=sqrt(y); both inverse branches contribute to the density.

Answer: support [0,36]

1. F_Y(y)=0 for y<0; F_Y(y)=sqrt(y)/6 for 0<=y<=36; F_Y(y)=1 above 36.
2. f_Y(y)=1/(2(6)sqrt(y)) for 0<y<36, and 0 otherwise. The two 1/(2sqrt(y)) Jacobian contributions combine.

8. **X is Uniform(0,7) and Y=-3X+1. Write the support and full piecewise CDF and PDF of Y.**

Reference: For a monotone map, solve the inequality for X. A negative slope reverses it; the density divides by the absolute derivative.

Answer: support [-20,1]

1. F_Y(y)=0 for y<-20; F_Y(y)=(y+20)/21 for -20<=y<=1; F_Y(y)=1 for y>1.
2. f_Y(y)=1/21 for -20<y<1, and 0 otherwise.