Math 122
Quiz 4 Review

1. Let $p(x) = \frac{x^2}{9}$ for $0 \leq x \leq 3$

a. Is $p(x)$ a valid probability density function?

b. Find $P(1 \leq X \leq 2)$

c. Find the mean μ.

2. Consider a random variable X with probability density function $p(x) = k\sqrt{x+10}$ on the interval $-6 \leq x \leq 6$.

a. For what value(s) of k is $p(x)$ a valid probability density function?

b. Compute $P(X \leq 0)$

c. Find the mean μ.

3. For any positive value β the function $p(x) = (\beta+1)(\beta+2)x^{\beta}(1-x)$ is a probability density function on the interval $0 \leq x \leq 1$. Find the mean in terms of β.

4. Find the arc length of the curve $y = \ln(\cos x)$ over the interval $[0, \pi/4]$.

5. Find the arc length of the curve $y = \frac{1}{4}x^{3/2}$ over the interval $[0, 4]$.

6. Find the arc length of the curve $y = \frac{1}{3}x^3 + \frac{1}{4x}$ over the interval $[1, 3]$.

7. Find the surface area generated by rotating $y = 7x$ from $x = 0$ and $x = 1$ about the x-axis.

8. Find the surface area generated by rotating $y = \sqrt{x}$ from $x = 0$ and $x = 2$ about the x-axis.

9. Find the surface area generated by rotating $y = \sqrt{x} - \frac{1}{3}x^{3/2}$ from $x = 1$ and $x = 3$ about the x-axis.

10. Find the surface area generated by rotating $y = x^3$ from $x = 0$ and $x = 1$ about the x-axis.

11. Find the surface area generated by rotating $y = \sqrt{4 - x^2}$ from $x = -1$ and $x = 1$ about the x-axis.

Answers

1. **a.** Yes

b. $\frac{7}{27}$

c. $\frac{9}{4}$

2. **a.** $\frac{3}{112}$

b. 0.421835

c. $\frac{22}{35}$

3. $\frac{\beta+1}{\beta+3}$

4. $\ln(\sqrt{2}+1)$

5. $\frac{122}{27}$

6. $\frac{53}{6}$

7. $35\sqrt{2}\pi$

8. $\frac{13\pi}{3}$

9. $\frac{16\pi}{9}$

10. $\frac{\pi}{27}(10^{3/2}-1)$

11. 8π