5. $27^{x-1} = 3$

$3^{3(x-1)} = 3^1$

$3(x-1) = 1$

$3x - 3 = 1$

$+3$

$\frac{3x}{3} = \frac{4}{3}$

$x = \frac{4}{3}$

6. $64^{5x-4} = 2$

$2^{6(5x-4)} = 2^1$

$6(5x-4) = 1$

$30x - 24 = 1$

$+24$

$\frac{30x}{30} = \frac{25}{30}$

$x = \frac{5}{6}$

7. $2^{5x} = 8^{2x-1}$

$2^{5x} = 2^{3(2x-1)}$

$5x = 6x - 3$

$-6x \quad -6x$

$-x = -3$

$x = 3$

8. $81^{2x-3} = 9^{x+3}$

$9^{2(2x-3)} = 9^{x+3}$

$2(2x-3) = x + 3$

$4x - 6 = x + 3$

$-x \quad -x$

$3x - 6 = 3$

$+6$

$\frac{3x}{3} = \frac{9}{3}$

$x = 3$

In the 1950s, scientists proposed a space station that could house a crew of approximately 80 people. The station could produce artificial gravity by rotating at a speed of $w = \sqrt{gr}$ where g is 32 feet per second squared, and r is the radius of the station. If the station design required a rotating speed of approximately 64 feet per second to simulate gravity on Earth, what would the radius need to be?

$$w = \sqrt{gr}$$

$$(64)^2 = \left(\sqrt{32r}\right)^2$$

$$\frac{4096}{32} = \frac{32r}{32}$$

$$128 = r$$