14. $-2 \ln 2 + \ln(x - 2) = \ln (2x - 4)$

$\ln \left[\frac{1}{4} (x - 2) \right] - \ln(2x - 4) = 0$

$\ln \frac{1}{4} + \ln (x - 2) - \ln 2 - \ln (x - 2) = 0$

$\ln \frac{1}{8} = 0$

This is a false statement, so there is **no solution.**

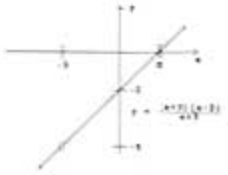
15. $x - \frac{1}{2} = \frac{1}{4\left(\frac{3}{2}\right)} (y - 1)^2$

$\mathbf{x = \frac{1}{6} (y - 1)^2 + \frac{1}{2}}$

16. $f(x) = \frac{x^2 + x - 6}{x + 3}$

$= \frac{(x + 3)(x - 2)}{x + 3}$

$= x - 2; \quad x \neq -3$



17. $\lim_{x \to -3} f(x) = -3 - 2$

$= -5$

18. $|3x - 1| < 16$

$3x - 1 < 16 \quad 3x - 1 > -16$

$3x < 17 \quad 3x > -15$

$x < \frac{17}{3} \quad x > -5$

$-5 < x < \frac{17}{3}$

since $x \in I$

$\mathbf{-5 < x \leq 5}$

19. $\frac{\sin^2 x + 2 \sin x \cos x + \cos^2 x - 1}{2 \sin (-x)}$

$= \frac{2 \sin x \cos x}{-2 \sin x}$

$= -\cos x$

20. $\frac{2 - \sqrt{3}}{1 - \sqrt{2}} \cdot \frac{1 + \sqrt{2}}{1 + \sqrt{2}}$

$= \frac{2 - \sqrt{3} + 2\sqrt{2} - \sqrt{6}}{-1}$

$= \mathbf{\sqrt{6} + \sqrt{3} - 2 - 2\sqrt{2}}$

21. $\text{midpoint}_1 = \left(\frac{c}{2}, \frac{d}{2} \right)$; $\text{midpoint}_2 = \left(\frac{c + a}{2}, \frac{d}{2} \right)$

$m = 0$; $y = \frac{d}{2}$

Thus, the line is parallel to the third side.

SOLUTION SET 40

1. The hands are 5 spaces apart, so the little hand will travel S spaces and the big hand will have to travel S + 5 spaces to catch up.

Little Hand	Big Hand
$R_L T_L = S$	$R_B T_B = S + 5$
$R_L = \frac{1}{12} \frac{\text{space}}{\text{min}}$	$R_B = 1 \frac{\text{space}}{\text{min}}$
$T_L = T_B$	

$\frac{T}{12} = T - 5$

$T = 12T - 60$

$11T = 60$

$\mathbf{T = 5\frac{5}{11} \text{ minutes}}$

2. $A = Ce^{kt}$; $20 = Ce^0 \rightarrow C = 20$

$A = 20e^{kt}$

$50 = 20e^{2k} \rightarrow k = \frac{1}{2} \ln \frac{5}{2} = 0.458$

$A = 20e^{(0.458)(5)} = \mathbf{197.64 \text{ cm}^2}$

3. $y = 3x^{-2} + 2 \sin u + 2e^t$

$\mathbf{dy = -6x^{-3} \, dx + 2 \cos u \, du + 2e^t \, dt}$

4. $y = 2 \ln|u| - 4x^{-1/2}$

$\mathbf{dy = \frac{2}{u} \, du + 2x^{-3/2} dx}$