Section 6.1 Exercises

1. $\int dy = \int (5x^4 - \sec^2 x)\,dx$

$y = x^5 - \tan x + C$

3. $\int dy = \int (\sin x - e^{-x} + 8x^3)\,dx$

$y = -\cos x + e^{-x} + 2x^4 + C$

7. $\int dy = \int (3t\cos(t^3))\,dt = \sin(t^3) + C$

11. $\int dy = \int 3\sin x\,dx = -3\cos x + C$

$2 = -3\cos(0) + C, \quad C = 5$

$y = -3\cos x + 5$

13. $\int du = \int (7x^6 - 3x^2 + 5)\,dx = x^7 - x^3 + 5x + C$

$1 = 1^7 - 1^3 + 5 + C, \quad C = -4$

$u = x^7 - x^3 + 5x - 4$

15. $\int dy = \int \left(-\frac{1}{x^2} - \frac{3}{x^4} + 12\right) dx = x^{-1} + x^{-3} + 12x + c$

$3 = 1^{-1} + 1^{-3} + 12(1) + C, \quad C = -11$

$y = x^{-1} + x^{-3} + 12x - 11 \quad (x > 0)$

Day 2

25. Graph (b).

$(\sin 0)^2 = 0$

$(\sin 1)^2 > 0$

$(\sin(-1))^2 > 0$

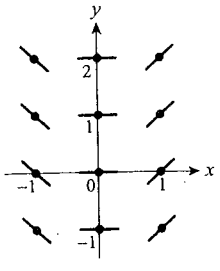
27. Graph (a).

$(\cos 0)^2 > 0$

$(\cos 1)^2 > 0$

$(\cos(-1)^2 > 0$

29.



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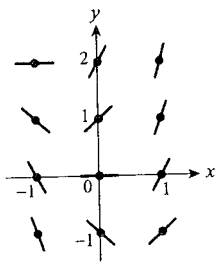

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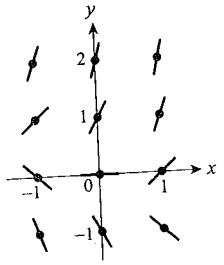

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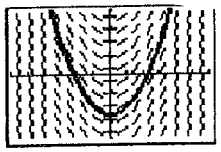

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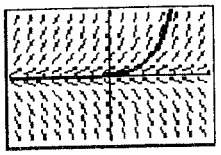

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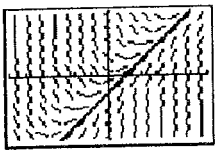

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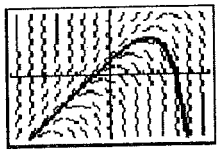

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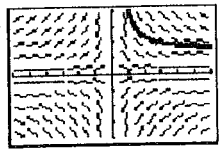

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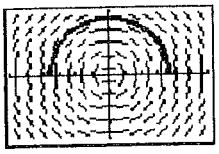


Day 3 6.1

41.

(x, y)	$\frac{dy}{dx} = x - 1$	Δx	$\Delta y = \frac{dy}{dx}\Delta x$	$(x + \Delta x, y + \Delta y)$
(1, 2)	0.0	0.1	0	(1.1, 2)
(1.1, 2)	0.1	0.1	0.01	(1.2, 2.01)
(1.2, 2.01)	0.2	0.1	0.02	(1.3, 2.03)

$y = 2.03$

43.

(x, y)	$\frac{dy}{dx} = 2x - y$	Δx	$\Delta y = \frac{dy}{dx}\Delta x$	$(x + \Delta x, y + \Delta y)$
(1, 2)	1.0	0.1	0.1	(1.1, 2.1)
(1.1, 2.1)	1.0	0.1	0.1	(1.2, 2.2)
(1.2, 2.2)	1.0	0.1	0.1	(1.3, 2.3)

$y = 2.3$

45.

(x, y)	$\frac{dy}{dx} = 2 - x$	Δx	$\Delta y = \frac{dy}{dx}\Delta x$	$(x + \Delta x, y + \Delta y)$
(2, 1)	0.0	–0.1	0.0	(1.9, 1)
(1.9, 1)	0.1	–0.1	–0.01	(1.8, 0.99)
(1.8, 0.99)	0.2	–0.1	–0.02	(1.7, 0.97)

47.

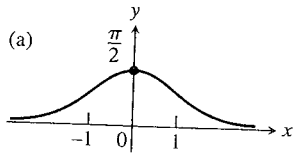
(x, y)	$\frac{dy}{dx} = x - y$	Δx	$\Delta y = \frac{dy}{dx}\Delta x$	$(x + \Delta x, y + \Delta y)$
(2, 2)	–0.0	–0.1	0	(1.9, 2.0)
(1.9, 2)	–0.1	–0.1	0.01	(1.8, 2.01)
(1.8, 2.01)	–0.21	–0.1	0.021	(1.7, 2.031)

$y = 2.031$

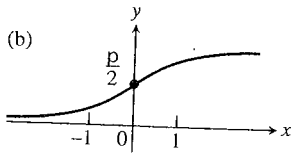
49. **(a)** Graph (b)

(b) The slope is always positive, so (a) and (c) can be ruled out.

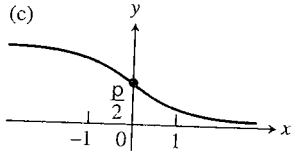
(a)



(b)



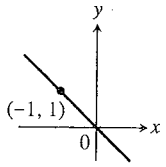
(c)



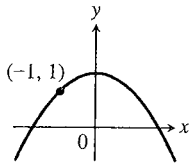
50. **(a)** Graph (b)

(b) The solution should have positive slope when x is negative, zero slope when x is zero and negative slope when x is positive since slope $= \frac{dy}{dx} = -x$.

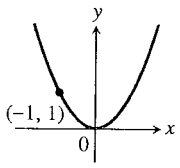
Graphs (a) and (c) don't show this slope pattern.



(a)



(b)



(c)

61. C. $m = 42 - 42 = 0$

62. E. $y < 0$, $x^2 > 0$, therefore $\frac{dy}{dx} < 0$.

63. B. $y(0) = e^{0^2} = 1$

$\frac{dy}{dx} = 2xe^{x^2} = 2xy$.

64. A.