24. \( f(x) = -x^6 - 2x^4 \)

(a) 

(b) The graph is increasing on \((-\infty, 0)\) and decreasing on \((0, \infty)\)

(c) \( f(-x) = -(-x)^6 - 2(-x)^4 = -x^6 - 2x^4 = f(x) \).

The function is even.

26. \( f(x) = -x^{3/4} \)

(a) 

(b) The graph is decreasing on \((0, \infty)\)

(c) The function is neither even nor odd. (Domain: \((0, \infty)\))

28. \( f(x) = x(x^2 + 1)^{1/2} \)

(a) 

(b) The graph is increasing on \((-\infty, \infty)\)

(c) \( f(-x) = (-x)((-x)^2 + 1)^{1/2} \)

\[ = -x(x^2 + 1)^{1/2} = -f(x). \]

The function is odd.

30. \( f(x) = -|x + 4| - |x + 1| \)

(a) 

(b) The graph is increasing on \((-\infty, -4)\), constant on \((-4, -1)\), and decreasing on \((-1, \infty)\).

(c) From the graph, it is clear that \( f \) is neither even nor odd.

32. Relative minimum: 
\((0.33, -5.33)\)

34. Relative minimum: \((4, -17)\)
Relative maximum: \((0, 15)\)

36. Maximum: \((2.67, 3.08)\)
38. (a) \( f(x) = 3x^2 - 12 \)

(b) Relative minimum: \((0, -12)\)

(c) The answer are the same.

40. (a) \( f(x) = -x^3 + 7x \)

(b) Approximate relative minimum: \((-\frac{3}{2}, -7)\)

Approximate relative maximum: \((\frac{3}{2}, 7)\)

(c) The answers are close.

42. (a) \( f(x) = \sqrt{4x^2 + 1} \)

(b) Relative minimum: \((0, 1)\)

(c) The answers are the same.

44. \( f(x) = \begin{cases} 
  x^2 + 5, & x \leq 1 \\
  -x^2 + 4x + 3, & x > 1 
\end{cases} \)

46. \( f(x) = \begin{cases} 
  1 - (x - 1)^2, & x \leq 2 \\
  \sqrt{x - 2}, & x > 2 
\end{cases} \)

48. \( f(-x) = (-x)^6 - 2(-x)^2 + 3 = x^6 - 2x^2 + 3 = f(x) \)

\( f \) is even.
50. \[ h(x) = x^3 - 5 \]
\[ h(-x) = (-x)^3 - 5 \]
\[ = -x^3 - 5 \]
\[ \neq h(x) \]
\[ \neq -h(x) \]
The function is neither odd nor even.

52. \[ f(-x) = (-x)\sqrt{(-x)} + 5 \]
\[ = -x\sqrt{-x} + 5 \]
\[ \neq f(x) \]
\[ \neq -f(x) \]
The function is neither even nor odd.

54. Because the domain is \( x \geq 0 \), the function is neither even nor odd.

56. \((-\frac{3}{5}, -7)\)
(a) If \( f \) is even, another point is \((\frac{3}{5}, -7)\).
(b) If \( f \) is odd, another point is \((\frac{3}{5}, 7)\).

58. \((5, -1)\)
(a) If \( f \) is even, another point is \((-5, -1)\).
(b) If \( f \) is odd, another point is \((-5, 1)\).

60. \((2a, 2c)\)
(a) If \( f \) is even, another point is \((-2a, 2c)\).
(b) If \( f \) is odd, another point is \((-2a, -2c)\).

62. \( f(x) = -9 \)
\( f \) is even.

64. \( f(x) = 5 - 3x \) is neither even nor odd.

66. \( f(x) = -x^2 - 8 \) is even.

68. \( g(t) = \sqrt[3]{t} - 1 \) is neither even nor odd.

70. \( f(x) = -|x - 5| \) is neither even nor odd.

72. \( f(x) = \begin{cases} 
2x + 1, & x \leq -1 \\
x^2 - 2, & x > -1 
\end{cases} \)
The graph is neither odd nor even.

74. \( f(x) = 4x + 2 \)
\( f(x) \geq 0 \)
\( 4x + 2 \geq 0 \)
\( 4x \geq -2 \)
\( x \geq -\frac{1}{2} \)
\( [-\frac{1}{2}, \infty) \)

76. \( f(x) = x^2 - 4x \)
\( f(x) \geq 0 \)
\( x^2 - 4x \geq 0 \)
\( x(x - 4) \geq 0 \)
\( (-\infty, 0], [4, \infty) \)
78. \( f(x) = x^2 + 1 \geq 0 \) for all \( x \).
\((-\infty, \infty)\)

80. \( f(x) = -2\sqrt{x - 3} \geq 0 \) for \( x = 3 \) only.

82. \( f(x) = \frac{1}{2}(2 + |x|) \)

\( = 1 + \frac{1}{2}|x| \geq 0 \) for all \( x \).
\((-\infty, \infty)\)

84. \( g(x) = 2\left(\frac{1}{2}x - \left\lfloor \frac{1}{2}x \right\rfloor\right)^2 \)

86. \( p = 100 - 0.0001x \)
\( C = 350,000 + 30x \)
\( P = R - C = xp - C = x(100 - 0.0001x) - (350,000 + 30x) \)
\( = x(100 - 0.0001x) - 350,000 - 30x \)
\( = -0.0001x^2 + 70x - 350,000 \)

Maximum at 350,000 units

88. **Model:** (Total cost) = (Flat rate) + (Rate per pound)

*Labels:* Total cost = \( C \)
Flat rate = 9.80
Rate per pound = 2.50\[\lfloor x \rfloor, \ x > 0 \]

*Equation:* \( C = 9.80 + 2.50\lfloor x \rfloor, \ x > 0 \)

90. \( h = \text{top} - \text{bottom} \)
\( = 3 - (4x - x^2) \)
\( = 3 - 4x + x^2, \quad 0 \leq x \leq 1 \)

92. \( h = \text{top} - \text{bottom} \)
\( = 2 - \frac{1}{2}x, \quad 0 \leq x \leq 8 \)

94. \( L = \text{right} - \text{left} \)
\( = 2 - \frac{1}{2}y, \quad 0 \leq y \leq 4 \)
96. \[\text{Interval} \quad \text{Intake Pipe} \quad \text{Drainpipe 1} \quad \text{Drainpipe 2}\]

<table>
<thead>
<tr>
<th>Interval</th>
<th>Intake Pipe</th>
<th>Drainpipe 1</th>
<th>Drainpipe 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>[0, 5]</td>
<td>Open</td>
<td>Closed</td>
<td>Closed</td>
</tr>
<tr>
<td>[5, 10]</td>
<td>Open</td>
<td>Open</td>
<td>Closed</td>
</tr>
<tr>
<td>[10, 20]</td>
<td>Closed</td>
<td>Closed</td>
<td>Closed</td>
</tr>
<tr>
<td>[20, 30]</td>
<td>Closed</td>
<td>Closed</td>
<td>Open</td>
</tr>
<tr>
<td>[30, 40]</td>
<td>Open</td>
<td>Open</td>
<td>Open</td>
</tr>
<tr>
<td>[40, 45]</td>
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<td>Closed</td>
<td>Open</td>
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<tr>
<td>[45, 50]</td>
<td>Open</td>
<td>Open</td>
<td>Open</td>
</tr>
<tr>
<td>[50, 60]</td>
<td>Open</td>
<td>Open</td>
<td>Closed</td>
</tr>
</tbody>
</table>

98. False. The domain must be symmetric about the y-axis.

100. \[f(x) = a_{2n}x^{2n} + a_{2n-2}x^{2n-2} + \cdots + a_2x^2 + a_0\]

\[f(-x) = a_{2n}(-x)^{2n} + a_{2n-2}(-x)^{2n-2} + \cdots + a_2(-x)^2 + a_0\]

\[= a_{2n}x^{2n} + a_{2n-2}x^{2n-2} + \cdots + a_2x^2 + a_0 = f(x)\]

\[f(-x) = f(x); \text{ thus, } f(x) \text{ is even.}\]

102. Yes, \(x = y^2 + 1\) defines \(x\) as a function of \(y\). (But not \(y\) as a function of \(x\))

104. (a) \[d = \sqrt{(6 - (-2))^2 + (3 - 7)^2} = \sqrt{64 + 16} = \sqrt{80} = 4\sqrt{5}\]

(b) midpoint \(= \left(\frac{-2 + 6}{2}, \frac{7 + 3}{2}\right) = (2, 5)\)

106. (a) \[d = \sqrt{\left(\frac{-3}{2}\right)^2 + (4 - (-1))^2} = \sqrt{16 + 25} = \sqrt{41}\]

(b) midpoint \(= \left(\frac{5 - 3}{2}, \frac{2 - 1 + 4}{2}\right) = \left(\frac{1}{2}, \frac{3}{2}\right)\)

108. \(f(x) = 5x - 1\)

(a) \(f(6) = 5(6) - 1 = 29\)

(b) \(f(-1) = 5(-1) - 1 = -6\)

(c) \(f(x - 3) = 5(x - 3) - 1 = 5x - 16\)

110. \(f(x) = x\sqrt{x - 3}\)

(a) \(f(3) = 3\sqrt{3 - 3} = 0\)

(b) \(f(12) = 12\sqrt{12 - 3} = 12\sqrt{9} = 12(3) = 36\)

(c) \(f(6) = 6\sqrt{6 - 3} = 6\sqrt{3}\)

112. \(f(x) = x^2 - 2x + 9\)

\[f(3 + h) = (3 + h)^2 - 2(3 + h) + 9 = 9 + 6h + h^2 - 6 - 2h + 9\]

\[= h^2 + 4h + 12\]

\[f(3) = 3^2 - 2(3) + 9 = 12\]

\[\frac{f(3 + h) - f(3)}{h} = \frac{(h^2 + 4h + 12) - 12}{h} = \frac{h(h + 4)}{h} = h + 4, h \neq 0\]