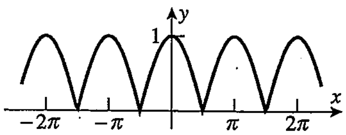
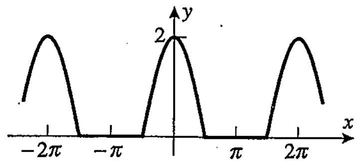
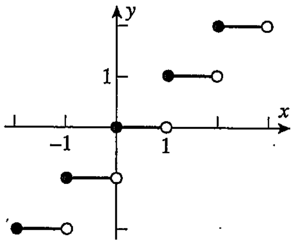
73. (a)



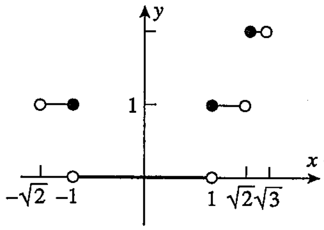
(b)



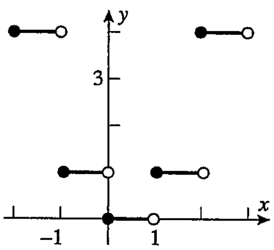
74. (a)



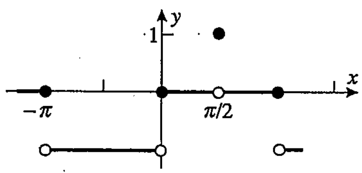
(b)



(c)



(d)

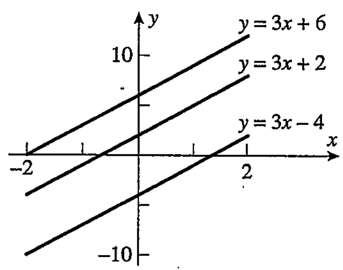


75. Yes, e.g. $f(x) = x^k$ and $g(x) = x^n$ where k and n are integers.

76. If $x \geq 0$ then $|x| = x$ and $f(x) = g(x)$. If $x < 0$ then $f(x) = |x|^{p/q}$ if p is even and $f(x) = -|x|^{p/q}$ if p is odd; in both cases $f(x)$ agrees with $g(x)$.

EXERCISE SET 1.4

1. (a) $y = 3x + b$ (b) $y = 3x + 6$ (c)

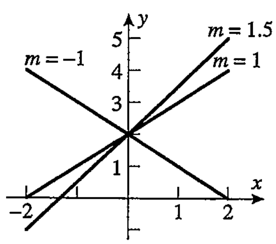


2. Since the slopes are negative reciprocals, $y = -\frac{1}{3}x + b$.

3. (a) $y = mx + 2$

(b) $m = \tan\phi = \tan 135° = -1$, so $y = -x + 2$

(c)



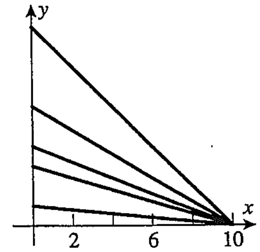
4. (a) $y = mx$ (b) $y = m(x - 1)$

(c) $y = -2 + m(x - 1)$ (d) $2x + 4y = C$

5. Let the line be tangent to the circle at the point (x_0, y_0) where $x_0^2 + y_0^2 = 9$. The slope of the tangent line is the negative reciprocal of y_0/x_0 (why?), so $m = -x_0/y_0$ and $y = -(x_0/y_0)x + b$. Substituting the point (x_0, y_0) as well as $y_0 = \pm\sqrt{9 - x_0^2}$ we get $y = \pm\dfrac{9 - x_0 x}{\sqrt{9 - x_0^2}}$.

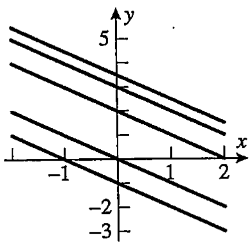
6. Solve the simultaneous equations to get the point $(-2, 1/3)$ of intersection. Then $y = \frac{1}{3} + m(x+2)$.

7. The x-intercept is $x = 10$ so that with depreciation at 10% per year the final value is always zero, and hence $y = m(x - 10)$. The y-intercept is the original value.

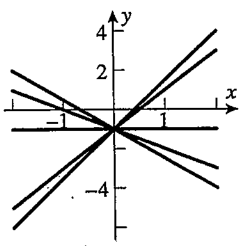


8. A line through $(6, -1)$ has the form $y + 1 = m(x - 6)$. The intercepts are $x = 6 + 1/m$ and $y = -6m - 1$. Set $-(6 + 1/m)(6m + 1) = 3$, or $36m^2 + 15m + 1 = (12m + 1)(3m + 1) = 0$ with roots $m = -1/12, -1/3$; thus $y + 1 = -(1/3)(x - 6)$ and $y + 1 = -(1/12)(x - 6)$.

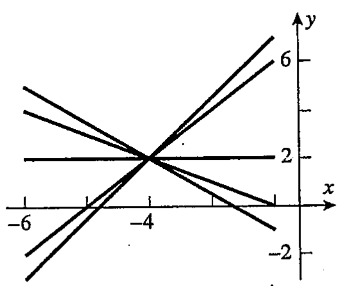
9. (a) The slope is -1.



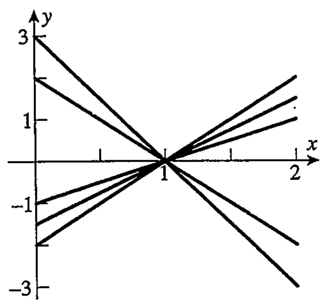
(b) The y-intercept is $y = -1$.



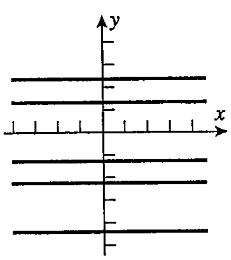
(c) They pass through the point $(-4, 2)$.



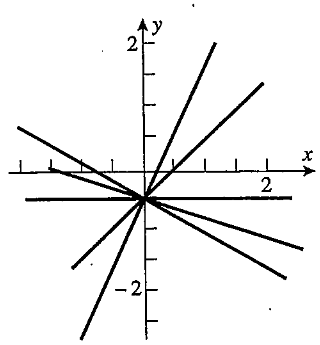
(d) The x-intercept is $x = 1$.



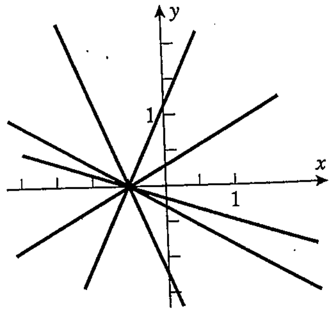
10. (a) horizontal lines



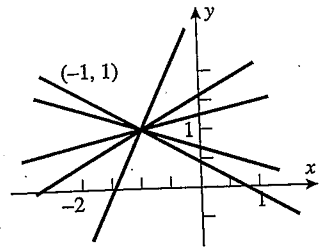
(b) The y-intercept is $y = -1/2$.



(c) The x-intercept is $x = -1/2$.



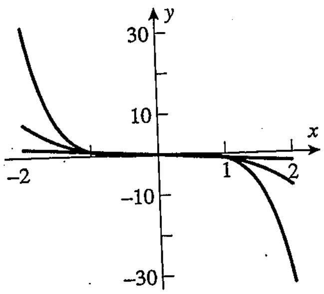
(d) They pass through $(-1, 1)$.

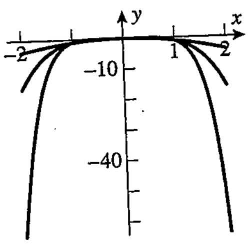


11. (a) VI (b) IV (c) III (d) V (e) I (f) II

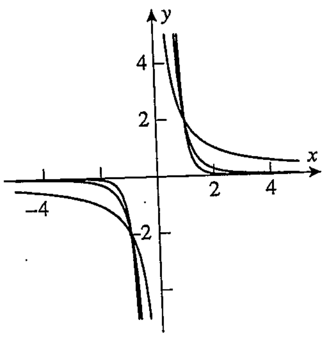
12. In all cases k must be positive, or negative values would appear in the chart. Only kx^{-3} decreases, so that must be $f(x)$. Next, kx^2 grows faster than $kx^{3/2}$, so that would be $g(x)$, which grows faster than $h(x)$ (to see this, consider ratios of successive values of the functions). Finally, experimentation (a spreadsheet is handy) for values of k yields (approximately) $f(x) = 10x^{-3}$, $g(x) = x^2/2$, $h(x) = 2x^{1.5}$.

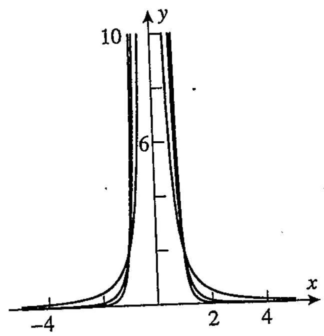
13. (a)





(b)





(c)