1. $y = -\frac{2}{3}x + \frac{10}{3}$
2. Shift the graph 3 units left and two units down.
3. a) $\frac{1}{3}$ b) $\frac{1}{5}$
4. $\sin\theta = \frac{1}{\sqrt{37}}$, $\cos\theta = \frac{6}{\sqrt{37}}$, $\csc\theta = \sqrt{37}$
5. $\sin\theta = \frac{-7}{\sqrt{50}}$, $\cos\theta = \frac{1}{\sqrt{50}}$, $\sec\theta = \sqrt{50}$
6. $\cos\theta = -\frac{\sqrt{84}}{10}$, $\tan\theta = \frac{-4}{\sqrt{84}}$
7. $\theta = 0, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}, \frac{\pi}{12}, \frac{7\pi}{12}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{17\pi}{12}, \frac{23\pi}{12}$
8. $\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{2}$
9. $(1, \infty)$
10. a) $f(x)$ is one-to-one for $x \neq -2$, $f^{-1}(x) = \frac{3-2x}{x-1}$ b) $f(x)$ is one-to-one for $x \geq 0$, $f^{-1}(x) = \sqrt{\frac{9}{x^2} - 2}$
11. $\sin^{-1}\left(-\frac{1}{2}\right) = -\frac{\pi}{6}$, $\tan^{-1}(-1) = -\frac{\pi}{4}$
12. $\frac{1}{\sqrt{x^2-1}}$
13. a) $x = \frac{\ln 4 + 4}{5}$ b) $x = \frac{1+\sqrt{1+4e}}{2}$
14. 2
15. $t = 3\log_2\left(\frac{y}{1000}\right)$. The population will reach 50,000 when $t = 3\log_2(50) = 3\frac{\log(2)}{\log(50)} = 16.932$ hrs.
16. (#38) $\lim_{t\to 1^-} g(t) = 2.5$, $\lim_{t\to 1^+} g(t) = 0.6$ $\lim_{t\to 2^-} g(t) = 2$, $\lim_{t\to 2^+} g(t) = 3$, $\lim_{t\to 4^-} g(t) = 2$, $\lim_{t\to 4^+} g(t) = 2$ (limit exists) $\lim_{t\to 5^-} g(t) = 1.4$, $\lim_{t\to 5^+} g(t) = 1.4$ (limit exists). (#46) $\lim_{x\to -1^-} f(x) = -\infty$, $\lim_{x\to -1^+} f(x) = \infty$, $\lim_{x\to 3} f(x) = \infty$, $\lim_{x\to 5} f(x) = -\infty$.

17. $9\frac{1}{3}$

18. a) 12 b) -9

19. $e^{\frac{\sqrt{2}}{2}}$

20. Jump discontinuity at $\frac{\pi}{2}$. $\lim_{x\to\frac{\pi}{2}^-} f(x) = 1$, $\lim_{x\to\frac{\pi}{2}^+} f(x) = 0$.

21. An example is $f(x) = \sin\left(\frac{1}{x-1}\right)$ with domain $(-\infty,-1)\cup(-1,1)\cup(1,\infty)$

22. a) -1 b) 0 c) Does not exist d) $\frac{1}{6}$

23. $-x^2 \leq x^2\cos\left(\frac{1}{x}\right) \leq x^2$, so since $\lim_{x\to 0} -x^2 = \lim_{x\to 0^+} x^2 = 0$, by the Squeeze Theorem, $\lim_{x\to 0} x^2\cos\left(\frac{1}{x}\right) = 0$.

24. Let $f(x) = \cos x - x$. Then $f(0) = 1$, $f(1) = \cos 1 - 1 < 0$, so by the Intermediate Value Theorem, $\cos x - x = 0$ for some x in $(0,1)$.

25. $\frac{1}{2\sqrt{5}}$