Precalculus Final Exam Review: Part 3 (Solutions)

1. $f^{-1}(x) = \dfrac{x^3 - 1}{2}$

2. $x = \dfrac{1}{3}$

3. $x \in \left(-\infty, \dfrac{5}{3}\right)$

4. $x = \dfrac{5}{2}$

5. $x = 2$, ($x = -9$ is extraneous)

6. $x = \dfrac{\ln 9 - \ln 5}{2\ln 5 - \ln 9}$

7. 960.7 mi apart

8. $A = 115.6$ km^2

9. (a) $\dfrac{\sqrt{2}}{2}$
   (b) $\dfrac{\sqrt{2}}{2}$
   (c) $-\dfrac{\sqrt{2}}{2}$
   (d) $-\dfrac{\sqrt{2}}{2}$
   (e) $\dfrac{\sqrt{2}}{2}$
   (f) $-\dfrac{\sqrt{2}}{2}$
   (g) $\dfrac{\sqrt{2}}{2}$
   (h) $-\dfrac{\sqrt{2}}{2}$

10. $\sin t = \dfrac{\sqrt{2}}{2}$, $\cos t = -\dfrac{\sqrt{2}}{2}$, $\tan t = -1$, $\csc t = \sqrt{2}$, $\sec t = -\sqrt{2}$, $\cot t = -1$

11. (a) 5 dm; (b) 6.28 dm

12. $x = \dfrac{300.6}{\tan 32^\circ} = 481.1$ m

13. $x = 4$, $y = -3$, $r = 5$; Q IV; $\sin\theta = -\dfrac{3}{5}$; $\cos\theta = \dfrac{4}{5}$; $\tan\theta = -\dfrac{3}{4}$; $\csc\theta = -\dfrac{5}{3}$; $\sec\theta = \dfrac{5}{4}$; $\cot\theta = -\dfrac{4}{3}$

14. 161.9 yd

15. Angles — Sides
$A = 137.9°$; $a = 15\sqrt{3}$ in.
$B = 15.6°$; $b = 6\sqrt{3}$ in.
$C = 26.5°$; $c = 10\sqrt{3}$ in.

16. (graph in textbook)

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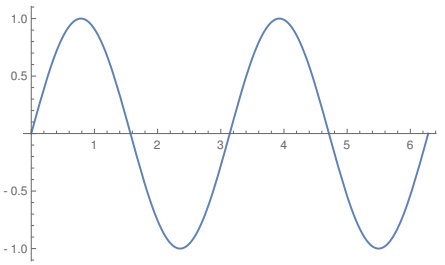
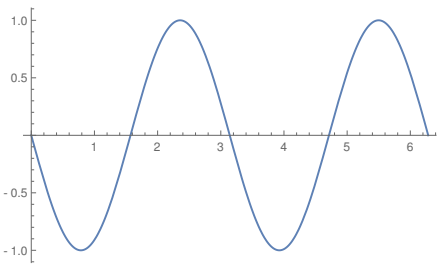
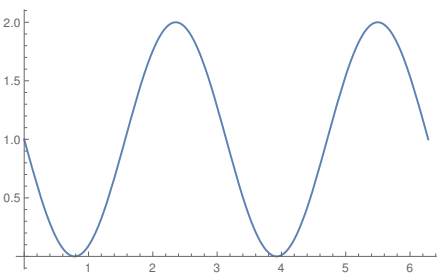
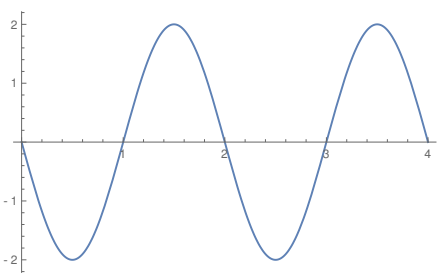
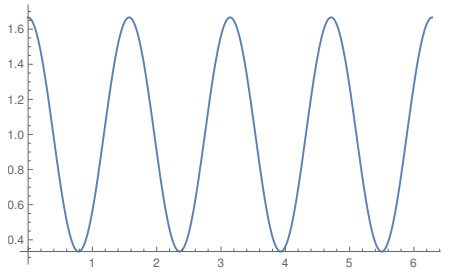
18. 

19. 

20. 

21. 

22. Amplitude: 3, Period: 4, VS: 0, HS: $\frac{3}{4}$ left, PI: $\left[-\frac{3}{4}, \frac{13}{4}\right)$

23. 

24. $y = 50\sin\left(\frac{\pi}{12}t - \pi\right) + 70$ (answers may vary)

25. (identity)

26. (identity)

27. (a) $-\frac{304}{425}$; (b) $-\frac{304}{297}$

28. $\sin(2\theta) = -\frac{120}{169}$, $\cos(2\theta) = \frac{119}{169}$, $\tan(2\theta) = -\frac{120}{119}$

29. $\frac{9}{8} + \frac{3}{2}\cos(2x) + \frac{3}{8}\cos(4x)$

30. $\sin\theta = \frac{\sqrt{2-\sqrt{2}}}{2}$, $\cos\theta = \frac{\sqrt{2+\sqrt{2}}}{2}$, $\tan\theta = \sqrt{\frac{2-\sqrt{2}}{2+\sqrt{2}}} = \sqrt{2} - 1$

31. $\frac{\pi}{3}$

32. $-\frac{\sqrt{3}}{3}$

33. $\frac{\sqrt{5}}{3}$

34. $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

35. P.R.: $x = \frac{2\pi}{3}$, 1.4455; $[0, 2\pi)$: $x = \frac{2\pi}{3}, \frac{4\pi}{3}$, 1.4455, 4.8377; all: $x = \frac{2\pi}{3} + 2\pi k, \frac{4\pi}{3} + 2\pi k$, $1.4455 + 2\pi k$, $4.8377 + 2\pi k$

36. P.R.: $x = \frac{5\pi}{12}$; $[0, 2\pi)$: $x = \frac{5\pi}{12}, \frac{7\pi}{12}, \frac{17\pi}{12}, \frac{19\pi}{12}$; all: $x = \frac{5\pi}{12} + \pi k, \frac{7\pi}{12} + \pi k$

37. P.R.: $x = 0.3398$; $[0, 2\pi)$: $x = 0.3398$, 2.8018; all: $x = 0.3398 + 2\pi k$, $2.8018 + 2\pi k$

38. no solution - inconsistent

39. $(p-1, -8p-2, p)$

40. $\{(x, y, z) \mid 3x - 4y + 2z = -2\}$

41. 0

42. $\left(-\frac{26}{3}, \frac{25}{3}\right)$

43. 50

44. $a_1 = 7$, $d = -3$, $a_n = 10 - 3n$, $a_6 = -8$, $a_{10} = -20$, $a_{12} = -26$

45. 6 terms

46. no finite sum

47. 1140

48. $-11 + 2i$