

Final Exam Spring 2009 Answers

1. d
2. b
3. a
4. b
5. None, this was a mistake, should have said which is equivalent to $\frac{x+2}{\sqrt{x^2+4x}}$ and the answer would be b.
6. c
7. a
8. c
9. b
10. d
11. $\sin \beta = -\frac{\sqrt{5}}{3}, \tan \beta = -\frac{\sqrt{5}}{2}, \csc \beta = -\frac{3}{\sqrt{5}}, \sec \beta = \frac{3}{2}, \cot \beta = -\frac{2}{\sqrt{5}}$
12. (1, 1)
13. Approximately 7.35 miles.
14. If graphed with $0 \leq x \leq 400$ and $0 \leq y \leq 100$, and tracing along the trajectory, we see the ball is at a height of 55 feet when the horizontal distance reaches 350, so the ball makes it on the green.
15. Vertical Ellipse; Center (-5, -2); Vertices $(-5, -2 \pm 2\sqrt{3})$; Foci: $(-5, -2 \pm 2\sqrt{2})$
16. Graph is the top half of a vertical ellipse centered at (5, 2), starting at the point (8, 2), reaching a peak at the point (5, 7), then ending at the point (2, 2).
17. 100 feet tall
18. Maximum: 4 at $x = -2$, Minimum -4 at $x = -4$. Increasing on $(-4, -2) \cup (4, 7)$, Decreasing on $(-2, 4)$
19. $x = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{3\pi}{2}$
20. Reflected over the x-axis, shifted 5 units right and 2 units up.

21. One way to prove is

$$\frac{\cos^3 \alpha}{\sin \alpha} + \sin \alpha \cos \alpha = \frac{\cos^3 \alpha}{\sin \alpha} + \frac{\sin^2 \alpha \cos \alpha}{\sin \alpha} = \frac{\cos \alpha (\cos^2 \alpha + \sin^2 \alpha)}{\sin \alpha} = \frac{\cos \alpha}{\sin \alpha} = \cot \alpha$$

22. Amplitude: 2, Period: 6π , two x-intercepts are $(\frac{3\pi}{2}, 0)$ and $(-\frac{3\pi}{2}, 0)$, two additional points are $(0, -2)$ and $(3\pi, 2)$.

23. When poured: 180° . Wait about 7.4 minutes for the temperature to reach 120°

24. $4x + 2h - 3$

25. Zeros: $1 \pm i$, 3 , $-\frac{4}{3}$. Factorization: $p(x) = (3x + 4)(x - 3)(x - 1 - i)(x - 1 + i)$