1. D This is $\frac{\frac{\sin x}{\cos x}+\frac{1}{\cos x}}{\frac{1}{\cos x}} = \sin x + 1$.

2. B This represents the equations $3a + 2b = 5$ and $a + 4b = 6$. The solution is $a = 0.8$ and $b = 1.3$, so the sum is $0.8 + 1.3 = 2.1$.

3. C Because $\alpha$ and $\beta$ are in quadrants where the tangent function is negative, we may use right triangles to determine that $\tan\alpha = -\frac{12}{5}$ and $\tan\beta = -\frac{4}{3}$. Using tangent addition formula, we have $\tan(\alpha+\beta) = \frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta} = \frac{-56/15}{-11/5} = \frac{56}{33}$.

4. B Let a point on this curve be $(a, 2\sqrt{a})$. Then, the distance to the point $(6, 0)$ is $\sqrt{(a-6)^2 + (2\sqrt{a}-0)^2} = \sqrt{a^2 - 8a + 36}$. To minimize the distance, we need to minimize $a^2 - 8a + 36$, which occurs at the vertex where $a = 4$. The distance is then $\sqrt{4^2 - 8 \cdot 4 + 36} = 2\sqrt{5}$.

5. A As $x \to \infty$, the constants become negligible, so we have $\sqrt{(x+1005)^2} - \sqrt{(x+5)^2} = (x + 1005) - (x + 5) = 1000$.

6. C If $x = 1$, we have $2t^2 + 8t + 9 = 1$, so $2(t + 2)^2 = 0$ and $t = -2$. Thus, $A$ is $-2 + 3 = 1$.

7. C Multiplying by 1 gives $\frac{\sqrt{x+5}-3}{x-4} \cdot \frac{\sqrt{x+5}+3}{\sqrt{x+5}+3} = \frac{1}{\sqrt{x+5}+3} = \frac{1}{3+3} = \frac{1}{6}$.

8. A After he picks three socks, if he does not have a pair, he has one of each color. Therefore, next sock must match one of the first three. He needs only to pull 4 from the drawer.

9. A All real numbers are also complex numbers (with an imaginary part of 0).

10. A $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. Therefore, our probability is $.25 + .5 - .75 = 0$.

11. C This is a sphere with radius 3. A sphere has volume $\frac{4\pi r^3}{3} = \frac{4\pi \cdot 27}{3} = 36\pi$.

12. A Let $x = 2^\omega$. Then, $x^2 - 3x + 2 = (x-1)(x-2) = 0$. So, $x = 1, 2$. Considering the two cases: $2^\omega = 1 \to \omega = 0$ and $2^\omega = 2 \to \omega = 1$. The sum is $0 + 1 = 1$.

13. D Expanding, we get (A)=(B)=(C). $\sin 2x \neq 1$, so D isn't equal.

14. D The range of $a^2$ is $[0, \infty)$, so this locus is a ray with initial point $(2, 0)$.

15. D Revenue = number of items sold × price per item, so $x(-.04x^2 + x + 1) = -.04x^3 + x^2 + x$.

16. E This is an upwards opening parabola. As $x \to \pm\infty$, $f(x) \to \infty$.

17. B $\pi$ radians = 180 degrees. So, $235° \cdot \frac{\pi \text{ radians}}{180°} = \frac{47\pi}{36}$.

18. A Let the radius of $A$ be $a$ and the radius of $B$ be $b$. Then, $\frac{45}{360} \cdot 2\pi a = \frac{30}{360} \cdot 2\pi b$, so $3a = 2b$, or $a = \frac{2b}{3}$. The ratio of the areas is $\frac{\pi a^2}{\pi b^2} = \frac{a^2}{b^2} = \frac{\frac{4b^2}{9}}{b^2} = \frac{4}{9}$.

19. B $121_b = 1 + 2b + b^2 = (b+1)^2$. So, $(b+1)^2 = 144$, so $b + 1 = 12$ and $b = 11$.

20. C At $x = 1006$, $-2x + 2010 < 0$, so the graph is $-(-2x + 2010) = 2x - 2010$, which has slope 2.

21. C Let the length of the longer leg be $x$, and the shorter leg and hypotenuse be $x - a$ and $x + a$, respectively. Then, $2a = 2010$ and $a = 1005$. So, $(x-a)^2 + x^2 = (x+a)^2$, giving $2x^2 - 2ax + a^2 = x^2 + 2ax + a^2$, so $x^2 = 4ax$, and $x = 4a = 4020$. It is interesting to note that all triangles of the year must be 3-4-5 triangles; try proving this.

22. C From the Pythagorean Identities, we know that $\sin^2 x + \cos^2 x = 1$, $\sec^2 x - \tan^2 x = 1$, and $\cot^2 x - \csc^2 x = -1$. The sum is then $1 + 1 - 1 = 1$.

23. B When $x$ is in the domain of $\ln x$ (as it is here), $e^{\ln x} = x$, so $\frac{x}{x} = 1$.

24. C Let the answer be $k$. Then, $2x^2 = 7 + k$ and $\frac{2}{x^2} = 7 - k$. Hence $\frac{2}{\frac{7+k}{2}} = 7 - k$, so $4 = 49 - k^2$. Thus, $k = \sqrt{45} = 3\sqrt{5}$.

25. B By basic matrix operation definitions, we have that $X = WZY^{-1}$.

26. B There are no more in the 28000s, so we go to 29092. The sum of the digits is 2+9+9+2=22.

27. C Converting to base 16, $\log_{16}(a^2 + b^2) + \log_{16}(a^2 b^2) = \log_{16}(a^2 - 2ab + b^2) + \log_{16}(a^2 b^2)$. Hence, $a^2 + b^2 = a^2 - 2ab + b^2$, so $ab = 0$. However, this is impossible for the domain $a > 0, b > 0$.

28. B Add them to get $2f(a) = 10$, so $f(a) = 5$ and $g(a) = 2$. The product is 10.

29. B Plug in $x = 0$ to get $0 = a + b + c$. Plug in $x = -1$ to get $-1 = d$. The sum is $-1$.

30. A Cross-multiply to obtain the equation $Ax + 2A + Bx + B = 12$. So, since $Ax + Bx = 0x$, $A + B = 0$. Substituting $B = -A$, we have $2A - A = 12$, so $A = 12$. Hence, $AB = -12(12) = -144$.