1. D	11. A	21. D
2. B	12. B	22. E
3. A	13. B	23. C
4. E	14. A	24. A
5. B	15. A	25. B
6. C	16. A	26. E
7. B	17. D	27. C
8. E	18. B	28. C
9. D	19. B	29. B
10. C	20. C	30. A

1. D

$F = C = -40$

➔ $\boxed{K = 233}$

2. B

$\boxed{\theta = \pi}$ plots in polar as the horizontal line $y = 0$.

3. A

$[x] = |x-1| - 1$

$[x] + 1 = x - 1$

or $[x] + 1 = 1 - x$

$[x] \in$ integers

$x = 0$ only

➔ 1 solution

4. E

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} y \\ x \end{bmatrix}$$

$$\boxed{\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}}$$

5. B

e = 2.718281828…

I. e exists on the real # line.

II. $e = e + 0i$, is complex.

III. e is irrational.

IV. e is transcendental

V. e is not a positive integer, thus e is not natural.

I, II, III, IV only

6. C

$$\sin\left(\frac{1}{2}A\right) = \sqrt{\frac{1-\cos A}{2}}$$

$$= \sqrt{\frac{1-m/c}{2}}$$

$$= \boxed{\sqrt{\frac{c-m}{2c}}}$$

7. B

$$\log_{2006} 425 = \frac{\log 425}{\log 2006}$$

$$= \frac{\log\left((100/4)\cdot 17\right)}{\log\left(2\cdot 17\cdot 59\right)}$$

$$= \boxed{\frac{2-2a+b}{a+b+c}}$$

8. E

$V = |\vec{u}\cdot(\vec{v}\times\vec{w})|$

$\vec{v}\times\vec{w} = \langle -63,-13,-54\rangle$

$V = |\langle 3,7,-4\rangle \cdot \langle -63,-13,-54\rangle|$

$= |-189-91+216| = |-64|$

$= 64$

9. D

$$r = \frac{12}{2+4\sin\theta}$$

$$= \frac{6}{1+2\sin\theta}$$

eccentricity = 2

➔ hyperbola

10. C

CSU founded in 1870

or…

k^{th} number of an n-gon:

$$\frac{(n-2)k^2}{2} - \frac{(n-4)k}{2}$$

$n = 10$, $k = 22$

➔ 1870

11. A

$K = Zgp^{-1}$

$$= (m)\left(\frac{m}{s^2}\right)\left(\frac{m^2}{N}\right)(1)$$

$$= (m)\left(\frac{m}{s^2}\right)\left(\frac{m^2}{N}\right)\left(\frac{N\cdot s^2}{kg\cdot m}\right)$$

$= \boxed{m^3/kg}$

12. B

$f(-x) = x^4 - 2x^3 - x^2 - 8x - 1$

One sign change.

➔ 1

13. B

polynomial division…

$$\frac{x^3 - x^2 + 2}{x+1} = \boxed{x^2 - 2x + 2}$$

14. A

From the graph, g(x) has a negative slope everywhere expept near x = 0, 10, where the slope is zero. This corresponds well with a(x).

N.B. $f(x) = x^3 - x^2 + 1$

15. A

$$\frac{d^{2006} f(x)}{dx^{2006}} = \sin\left(x + \frac{2006\pi}{2}\right)$$

$$= \sin(x + 1003\pi)$$

$$= \boxed{-\sin(x)}$$

16. A

$6S = 1 + 2/6 + 3/36 + ...$

$S = 0 + 1/6 + 2/36 + ...$

$5S = 1 + 1/6 + 1/36 + ...$

$= \frac{1}{1 - 1/6} = \frac{6}{5}$

➔ $S =$ 6/25

17. D

$\frac{d}{dx}\left(x^{2006}\right) = \boxed{2006x^{2005}}$

18. B

$\boxed{\{\text{real numbers}\} >> \{\text{neg. integers}\}}$

The real number line is continuous. Thus a one-to-one correspondence cannot be made to the negative integers.

19. B

P(success)…

Box 1: (1/4)(4/5)(3/4)

Box 2: (1/4)(3/5)(2/4)

Box 3: (1/4)(2/5)(1/4)

Box 4: (1/4)(1/5)(0/4)

$\frac{12 + 6 + 2 + 0}{80} = \boxed{\frac{1}{4}}$

20. C

Given: $p \to q$ is true

$\sim p \vee q$ is true

p is sufficient for q means

$p \to q$ which is true

$\sim q \to \sim p$ is true

$\boxed{p \wedge \sim q}$ is false

21. D

$a^2 - b^2 = 5 \; and \; 2ab = -12$

$a = -6/b \Rightarrow 36/b^2 - b^2 = 5$

$b^4 + 5b^2 - 36 = \left(b^2 + 9\right)\left(b^2 - 4\right) = 0$

➔ $\boxed{b = \pm 2}$

22. E

$\frac{x}{y} = \frac{6\sqrt{3}}{3}\frac{cis105°}{cis45°}$

$= 2\sqrt{3}cis60°$

$= 2\sqrt{3}\left(1/2 + i\sqrt{3}/2\right)$

$= \boxed{\sqrt{3} + 3i}$

23. C

Min. of $\sqrt{x^2 + y^2 + z^2}$ is the distance from the origin to the plane $x - 5y + z + 3 = 0$.

➔ $\frac{|0 - 5(0) + 0 + 3|}{\sqrt{1 + 25 + 1}} = \boxed{\frac{\sqrt{3}}{3}}$

24. A

$\frac{24}{V - 3} + \frac{24}{V + 3} = \frac{50}{V}$

$\boxed{V = 15 \text{ mph}}$

25. B

I. $n^3 - n = n(n+1)(n-1)$ is divisible by 6.

II. $2 = 2^1$

III. $\cos(n\pi) = (-1)^n$

➔ I, III only

26. E

$$z = \frac{\begin{vmatrix} 9 & 6 & 0 \\ 2 & 1 & 1 \\ 2 & 0 & 6 \end{vmatrix}}{\begin{vmatrix} 9 & 6 & -8 \\ 2 & 1 & -8 \\ 2 & 0 & 0 \end{vmatrix}}$$

27. C

$g(x) = (x+2)(x-17)(x-34) \geq 0$

roots: -2, 17, 34

test points: -10, 0, 20, 100

-10 ➔ neg. 0 ➔ pos.

20 ➔ neg. 100 ➔ pos.

➔ $\boxed{[-2,17] \cup [34,\infty)}$

28. C

$\tan\theta + \frac{\cos\theta}{1 + \sin\theta}\left(\frac{1 - \sin\theta}{1 - \sin\theta}\right)$

$\tan\theta + \frac{\cos\theta(1 - \sin\theta)}{\cos^2\theta}$

$\tan\theta + \sec\theta - \tan\theta$

➔ $\boxed{\sec\theta}$

29. B

$\sin(\alpha + \beta)$

$= \sin\alpha\cos\beta + \sin\beta\cos\alpha$

$= \left(\frac{12}{13}\right)\left(\frac{3}{5}\right) + \left(\frac{5}{13}\right)\left(\frac{4}{5}\right) = \frac{56}{65}$

➔ 56 + 65 = 121

30. A

$(x - h)^2 = 4p(y - k)$

vertex @ (h, k)

➔ The directrix is the horizontal line…

$\boxed{y = k - p}$