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

SOLUTIONS:

1.
$$g(x) = 3x + 10$$
$$g(2) = 3(2) + 10$$
$$g(2) = 6 + 10$$
$$g(2) = 16$$

2. D is not a function since there is more than one y-value for x=3.

3.
$$3y - 7x + 10 = 0$$
$$3y = 7x - 10 \qquad \text{Slope} = \frac{7}{3}$$
$$y = \frac{7}{3}x - \frac{10}{3}$$

4. $f(2) = 2^4 - 4 = 16 - 4 = 12$

$$g\left(f(2), 4\right) = g(12, 4)$$
$$g(12, 4) = 42(12^4) = 870{,}912$$

$$2x - 3y = 17$$
$$3x + 2y = 6$$

$$4x - 6y = 34$$
$$9x + 6y = 18$$

5.
$$13x = 52$$
$$x = 4$$

$$2(4) - 3y = 17$$
$$8 - 3y = 17$$
$$-3y = 9$$
$$y = -3$$

6. Find the slope:

$$m = \frac{\left(2 - (-1)\right)}{\left(-3 - 0\right)} = \frac{3}{-3} = -1$$

You can see the y-intercept is at (0,-1) so then the equation for the line is:

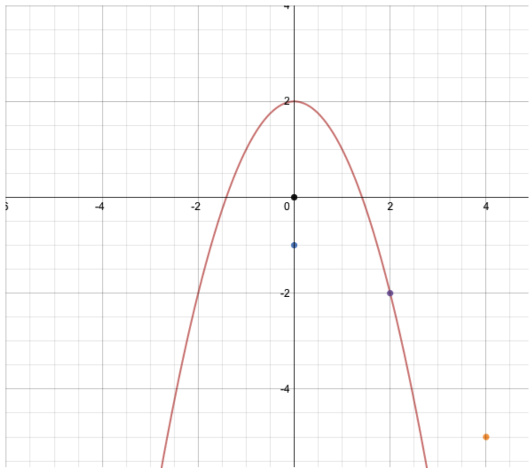
$$y = mx + b$$
$$y = (-1)x + (-1)$$
$$y = -x - 1$$
$$x + y = -1$$

7.
$$p(-2) = -4^{3(-2)}$$
$$p(-2) = -4^{-6}$$
$$p(-2) = -\frac{1}{4^6}$$
$$p(-2) = -\frac{1}{4096}$$

$$V = 80 - 32t$$

8.
$$16 = 80 - 32t$$
$$32t = 64$$
$$t = 2$$

9. Looking at the graph



You'll see that (4,-5) is the only point above the graph.

10. The inverse of $h(x)=2x^3+3$ is

$$x=2(h^{-1}(x))^3+3$$
$$x-3=2(h^{-1}(x))^3$$
$$\frac{x-3}{2}=(h^{-1}(x))^3$$
$$h^{-1}(x)=\sqrt[3]{\frac{x-3}{2}}$$

11.
$$g(x)=\frac{5}{3}\cdot\left|-\frac{2}{3}x-\frac{5}{3}\right|+\frac{3}{2}$$
$$g\left(\frac{4}{3}x\right)=\frac{5}{3}\cdot\left|-\frac{2}{3}\left(\frac{4}{3}x\right)-\frac{5}{3}\right|+\frac{3}{2}$$
$$g\left(\frac{4}{3}x\right)=\frac{5}{3}\cdot\left|-\frac{8}{9}x-\frac{5}{3}\right|+\frac{3}{2}$$
$$g\left(\frac{4}{3}x\right)=\frac{5}{3}\cdot\left|\frac{-8x-15}{9}\right|+\frac{3}{2}$$
$$g\left(\frac{4}{3}x\right)=\frac{5\left|\frac{-8x-15}{9}\right|}{3}+\frac{3}{2}$$
$$g\left(\frac{4}{3}x\right)=\frac{10\left|\frac{-8x-15}{9}\right|+9}{6}$$

12.
$$y=\sqrt{(x+5)+1}+7$$
$$y=\sqrt{x+6}+7$$

13. Find the slope of the original line

$$2y-x=x+10$$
$$2y=2x+10$$
$$y=x+5$$
$$m=1$$

Then find the equation of the line through (3,10) with slope $m=1$

$$y-10=1(x-3)$$
$$y-10=x-3$$
$$y=x+7$$
$$0=x-y+7$$

14. Because the ceiling makes a $45°$ angle, the slope of the line will be the ratio of the legs of a 45/45/90 right triangle. The legs have equal length thus the slope is $m=1$ and the equation for the line would be $y=x$.

15. $$p(x)=x^2-2x$$
$$p(6)=6^2-2(6)=36-12=24$$

16. Use subsitution to find the intersecting point of the first 2 equations:

$$y=2x+3$$
$$x+y=2$$
$$x+(2x+3)=2$$
$$3x+3=2$$
$$3x=-1$$
$$x=-\frac{1}{3}$$
$$y=2\left(-\frac{1}{3}\right)+3$$
$$y=-\frac{2}{3}+3$$
$$y=\frac{7}{3}$$
$$\left(-\frac{1}{3},\frac{7}{3}\right)$$

Confirm that $\left(-\frac{1}{3},\frac{7}{3}\right)$ satisfies the 3rd equation:

$$3y=-15x+2$$
$$3\left(\frac{7}{3}\right)=-15\left(-\frac{1}{3}\right)+2$$
$$7=5+2$$
$$7=7$$

And it does.

$(f \circ g)(n^2)$

$g(n^2) = 3n^2 + 2$

17. $(f \circ g)(n^2) = (3n^2 + 2)^2 - 3$

$= 9n^4 + 12n^2 + 4 - 3$

$= 9n^4 + 12n^2 + 1$

18. $c = \left(-\frac{25}{13} \div 2\right)^2 = \left(-\frac{25}{26}\right)^2$

$= \frac{625}{676}$

19. $f(-8) = (-8)^2 - 4(-8)$

$= 64 + 32 = 96$

20. $x = \log_6\left(4\left(h^{-1}(x)\right) + 4\right)$

$6^x = \left(4\left(h^{-1}(x)\right) + 4\right)$

$6^x - 4 = 4\left(h^{-1}(x)\right)$

$\frac{6^x - 4}{4} = h^{-1}(x)$

21. To factor the difference of cubes:

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$ so

here $a^3 = -27u^3$ and $b^3 = 125$ so

$a = -3u$ and $b = 5$ so to factor:

$-27u^3 + 125$

$= (-3u + 5)\left(9u^2 - (-3u)(5) + 25\right)$

$= (-3u + 5)\left(9u^2 + 15u + 25\right)$

$(g - f)(3t) = g(3t) - f(3t)$

$g(3t) = 3t - 4$

22. $f(3t) = 4(3t) = 12t$

$g(3t) - f(3t) = 3t - 4 - 12$

$= -9t - 4$

$g(4) = 12$

23. $g(4) = g(4-3) + 2(4)$

$12 = g(1) + 8$

$4 = g(1)$

then

$g(1) = 4$

$g(1) = g(1-3) + 2(1)$

$4 = g(-2) + 2$

$2 = g(-2)$

and finally

$g(-2) = 2$

$g(-2) = g(-2-3) + 2(-2)$.

$2 = g(-5) - 4$

$6 = g(-5)$

24. Factor $f(x) = x^3 - 2x^2 + x$

$f(x) = x\left(x^2 - 2x + 1\right)$

$f(x) = x(x-1)^2$

zeroes at $x = 0$ and $x - 1 = 0$, $x = 1$

25. You'll see I and III are odd functions since $-f(x) = f(-x)$.

Only II is an even function since

$f(x) = f(-x)$

$|x| = |-x|$

26.

$$\frac{2015x^{2015} + 2015x^{2014} + \ldots + 2015x^1 + 2015x^0}{x+1}$$
$$= 2015x^{2014} + 2015x^{2012} + \ldots + 2015x^2 + 1$$

So the remainder is 0.

27. $v\left(w^{-1}\left(u(-2)\right)\right)$

$u(x) = x^2 - 4$

$u(-2) = (-2)^2 - 4 = 4 - 4 = 0$

$$x = \frac{1}{w^{-1}(x) - 1}$$
$$w^{-1}(x) = \frac{1+x}{x}$$
$$w^{-1}(0) = \frac{1+0}{0} = \frac{1}{0}$$

$w^{-1}(0)$ is undefined so

$v\left(w^{-1}\left(u(-2)\right)\right)$ is undefined.

28. If you know the chord has a length of r and the diameter is 2r then triangle made by the chord and the radii connecting to each end create an equilateral triangle of side r. By finding the area of the sector ($\frac{1}{6}$ of the whole circle) and subtracting the area of the triangle, you will get $\frac{1}{2}$ the area of the surfboard.

$$A = 2\left(\frac{\pi r^2}{6} - \frac{r^2\sqrt{3}}{4}\right)$$
$$A = \left(\frac{\pi r^2}{3} - \frac{r^2\sqrt{3}}{2}\right)$$

29. Since Baxter changed the height of the water by x inches ($\frac{x}{12}$ feet) then his volume can be found by

$$V = 9\pi\left(\frac{x}{12}\right)$$
$$V = \frac{3\pi x}{4} ft^3$$

30. $b^2 - 4ac = (-7)^2 - 4(1)(12)$
$= 49 - 48 = 1$