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 \( x=3 \).

   \( 3y - 7x + 10 = 0 \)

3. \( 3y = 7x - 10 \) \hspace{0.5cm} \text{Slope} = \frac{7}{3} \)
   \[ y = \frac{7}{3}x - \frac{10}{3} \]

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

   \( g(f(2), 4) = g(12, 4) \)
   \( g(12, 4) = 42(12^4) = 870,912 \)

5. \( 13x = 52 \)
   \[ x = 4 \]

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

6. Find the slope:

   \[ m = \frac{(2 - (-1))}{(-3 - 0)} = \frac{3}{-3} = -1 \]

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

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. \( g(x) = \frac{5}{3} \left| \frac{2}{3} x - \frac{5}{3} \right| + \frac{3}{2} \)

\[
g \left( \frac{4}{3} x \right) = \frac{5}{3} \left| \frac{2}{3} \left( \frac{4}{3} x \right) - \frac{5}{3} \right| + \frac{3}{2}
\]

\[
g \left( \frac{4}{3} x \right) = \frac{5}{3} \left| \frac{8}{9} x - \frac{5}{3} \right| + \frac{3}{2}
\]

\[
g \left( \frac{4}{3} x \right) = \frac{5}{3} \left| -8x - 15 \right| + \frac{3}{2}
\]

\[
g \left( \frac{4}{3} x \right) = \frac{5}{3} \left| -\frac{8x - 15}{9} \right| + \frac{3}{2}
\]

\[
g \left( \frac{4}{3} x \right) = \frac{10}{9} - \frac{8x - 15}{9} + 9
\]

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 substitution to find the intersecting point of the first 2 equations:

\[
\begin{align*}
  y &= 2x + 3 \\
  x + y &= 2 \\
  x + (2x + 3) &= 2 \\
  3x + 3 &= 2 \\
  3x &= -1 \\
  x &= -\frac{1}{3} \\
  y &= 2\left(-\frac{1}{3}\right) + 3 \\
  y &= -\frac{2}{3} + 3 \\
  y &= \frac{7}{3} \\
  \left(-\frac{1}{3}, \frac{7}{3}\right)
\end{align*}
\]

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

\[
\begin{align*}
  3y &= -15x + 2 \\
  3\left(\frac{7}{3}\right) &= -15\left(-\frac{1}{3}\right) + 2 \\
  7 &= 5 + 2 \\
  7 &= 7
\end{align*}
\]
And it does.
17. \[(f \circ g)(n^2) = (3n^2 + 2)^2 - 3 = 9n^4 + 12n^2 + 4 - 3 = 9n^4 + 12n^2 + 1\]

18. \[c = \left(\frac{-25}{13} + 2\right)^2 = \left(\frac{-25}{26}\right)^2\]
\[= \frac{625}{676}\]

19. \[f(-8) = (-8)^2 - 4(-8) = 64 + 32 = 96\]
\[x = \log_x(4(h^{-1}(x) + 4)\]
\[6^x = (4(h^{-1}(x) + 4)\]

20. \[6^x - 4 = 4(h^{-1}(x)\]
\[\frac{6^x - 4}{4} = h^{-1}(x)\]

21. To factor the difference of cubes:
\[a^3 + b^3 = (a + b)(a^2 - ab + b^2) \text{ so}\]
\[a^3 = -27u^3 \text{ and } b^3 = 125 \text{ so}\]
\[a = -3u \text{ and } b = 5 \text{ so to factor:}\]
\[-27u^3 + 125\]
\[= (-3u + 5)(9u^2 - (-3u)(5) + 25)\]
\[= (-3u + 5)(9u^2 + 15u + 25)\]

22. \[(g - f)(3t) = g(3t) - f(3t)\]
\[g(3t) = 3t - 4\]

23. \[g(4) = 12\]
\[12 = g(1) + 8\]
\[4 = g(1)\]

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 \[f(x) = x^3 - 2x^2 + x\]
\[f(x) = x(x^2 - 2x + 1)\]
\[f(x) = x(x - 1)^2\]

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

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

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

\[
x = \frac{1}{w^{-1}(x) - 1}
\]

\[
w^{-1}(x) = \frac{1 + x}{x}
\]

\[
w^{-1}(0) = \frac{1 + 0}{0} = \frac{1}{0}
\]

$w^{-1}(0)$ is undefined so $v\left(w^{-1}(u(-2))\right)$ 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 ($\frac{\theta}{6}$ 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

\[
V = 9\pi \left( \frac{x}{12} \right)
\]

\[
V = \frac{3\pi x}{4} \text{ ft}^3
\]

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