1. Solve the following equation for x : $2(x+2)-3=-x$.

   a) $\frac{1}{3}$

   b) 1

   c) -1

   d) 3

   e) $-\frac{1}{3}$

2. Solve the following equation for p: $\frac{p-4}{6}-\frac{2p}{3}=\frac{1-3p}{2}$.

   a) $\frac{7}{6}$

   b) $\frac{4}{3}$

   c) $-\frac{1}{3}$

   d) $\frac{5}{6}$

   e) $-\frac{5}{2}$

3. Solve the following equation for x: $3x^2-5x=12$.

   a) $x=-3, x=\frac{4}{3}$

   b) $x=3, x=-\frac{3}{4}$

   c) $x=\frac{1}{3}, x=-\frac{4}{3}$

   d) $x=3, x=-\frac{4}{3}$

   e) $x=-\frac{1}{3}, x=\frac{4}{3}$

4. Put the quadratic function $f(x)=x^2+3x$ into the form $(x-h)^2+k$ by completing the square.

   a) $(x-3)^2+9$

   b) $\left(x+\frac{3}{2}\right)^2-\frac{9}{4}$

   c) $\left(x-\frac{3}{2}\right)^2+\frac{9}{4}$

   d) $(x+3)^2-9$

   e) $\left(x-\frac{3}{2}\right)^2-\frac{9}{2}$

5. Given the quadratic equation $-3x^2+\sqrt{5}\,x-1=0$, find the discriminant and determine the number of real solutions.

   a) Discriminant 7; 2 real solutions

   b) Discriminant 7; no real solutions

   c) Discriminant -7; 2 real solutions

   d) Discriminant -7; 1 real solution

   e) Discriminant -7; no real solutions

6. Solve the following equation for x: $(x+2)^3-2(x+2)^2+(x+2)=0$.

   a) $x=-1,\ x=-2$

   b) All real numbers

   c) No solutions

   d) $x=1,\ x=-2$

   e) $x=-1,\ x=2$

7. Solve the following equation for x: $|x^2-3x|=2$.

   a) $x=2,\ x=1,\ x=\frac{-3+\sqrt{17}}{2}, x=\frac{-3-\sqrt{17}}{2}$

   b) $x=-2,\ x=-1,\ x=\frac{3+\sqrt{17}}{2}, x=\frac{3-\sqrt{17}}{2}$

   c) $x=2,\ x=1,\ x=\frac{3+\sqrt{17}}{2}, x=\frac{3-\sqrt{17}}{2}$

   d) $x=-2,\ x=1,\ x=\frac{-3+\sqrt{17}}{2}, x=\frac{-3-\sqrt{17}}{2}$

   e) $x=2,\ x=-1,\ x=\frac{-3+\sqrt{17}}{2}, x=\frac{-3-\sqrt{17}}{2}$

8. Solve the following inequality for x: $(x-2)(x+1)(2x+3)\le 0$.

   a) $\left[-\frac{2}{3},-1\right]\cup[2,\infty)$

   b) $(-1,2)$

   c) $\left(-\infty,-\frac{3}{2}\right]\cup[-1,2]$

   d) $\left[-\frac{3}{2},-1\right]\cup[2,\infty)$

   e) $\left(-\infty,-\frac{3}{2}\right)\cup(-1,2)$

9. Solve the following inequality for x: $|2-3x|-4 \geq 3$.

a) $\left(-\infty, -\frac{5}{3}\right] \cup [3, \infty)$

b) $(-\infty, -3] \cup \left[\frac{5}{3}, \infty\right)$

c) $(-\infty, -3]$

d) $\left[-\frac{5}{3}, \infty\right)$

e) $\left(-\infty, \frac{5}{3}\right] \cup [3, \infty)$

10. Solve the following inequality for x: $2x-1 > x-2(3+2x)$.

a) $(-\infty, 1]$

b) $(-\infty, \infty)$

c) No solutions

d) $[-1, \infty)$

e) $(-1, \infty)$

11. Solve the following inequality for x: $\frac{1}{x} + x \leq \frac{x^2-x-1}{x}$.

a) $[0, 2)$

b) $(0, 2]$

c) $(-2, 0)$

d) $[-2, 0]$

e) $[-2, 0)$

12. Find the domain of $f(x) = \sqrt{x^3 - x^2 + x - 1}$.

a) $(-\infty, -1) \cup (1, \infty)$

b) $[1, \infty)$

c) $(-\infty, -1] \cup [1, \infty)$

d) $[-1, 1]$

e) $(-\infty, -1)$

13. The surface area of a sphere of radius r is given by $S(r) = 4\pi r^2$. Find $S\left(\frac{r}{2}\right)$.

a) 2π

b) πr^2

c) $2\pi r^2$

d) $\frac{1}{2}\pi r^2$

e) $2\pi r$

14. If $f(x) = x^2 + 1$, find $\frac{f(x+h) - f(x)}{h}$.

a) h

b) $-2x - h$

c) $-2x + h$

d) $2x + h$

e) $2x - h$

15. Determine if the following functions f and g are even, odd or neither:

$$f(x) = x^3 - x, \; g(x) = \frac{1}{\sqrt{1-x^2}}.$$

a) Both functions are odd.

b) Both functions are even.

c) f is even, g is odd.

d) f is odd, g is even.

e) Both functions are neither even nor odd.

16. Which of the following statements is always true?

a) The graph of a function may have several y-intercepts.

b) Every function's graph must have at least one x-intercept.

c) The graph of a function can have at most one x-intercept.

d) The graph of a constant function has no y-intercepts.

e) The graph of a function may have more than one x-intercept.

17. Suppose

$$g(x) = \begin{cases} \frac{1}{x} \text{ if } -2 < x < 0; \\ 2\sqrt{x} \text{ if } 0 \leq x < 1; \\ |x| \text{ if } x \geq 1. \end{cases}$$

Find $g\left(\frac{1}{100}\right)$ and $g\left(-\frac{1}{100}\right)$.

a) $g\left(\frac{1}{100}\right) = 0.2$, $g\left(-\frac{1}{100}\right) = 0.01$

b) $g\left(\frac{1}{100}\right) = 0.2$, $g\left(-\frac{1}{100}\right) = 100$

c) $g\left(\frac{1}{100}\right) = 0.2$, $g\left(-\frac{1}{100}\right) = -100$

d) $g\left(\frac{1}{100}\right) = 100$, $g\left(-\frac{1}{100}\right) = -0.2$

e) $g\left(\frac{1}{100}\right) = -100$, $g\left(-\frac{1}{100}\right) = 0.2$

18. Which of the following functions has a graph that increases everywhere?

    a) $|x|$

    b) $1 - x$

    c) $\frac{1}{x}$

    d) $\sqrt[3]{x}$

    e) x^2

19. Which of the following statements is true?

    a) The graph of $y = f(x+c)$ is obtained by shifting the graph of $y = f(x)$ horizontally to the left c units.

    b) The graph of $y = f(x+c)$ is obtained by shifting the graph of $y = f(x)$ horizontally to the right c units.

    c) The graph of $y = f(x+c)$ is obtained by shifting the graph of $y = f(x)$ vertically upward c units.

    d) The graph of $y = f(x+c)$ is obtained by shifting the graph of $y = f(x)$ vertically downward c units.

    e) The graph of $y = f(x + c)$ is obtained by reflecting the graph of $y = f(x)$ across the line $x = c$.

20. If $f(x) = x-1$ and $g(x) = \sqrt{\frac{2x^2}{x+1}}$, what is the domain of $(g \circ f)(x)$?

    a) $(1, \infty)$

    b) $[1, \infty)$

    c) $(0, \infty)$

    d) $(-\infty, 0) \cup (1, \infty)$

    e) $(-\infty, 0]$

EXAM I- SAMPLE D

1. E
2. A
3. D
4. B
5. E
6. A
7. C
8. C
9. A
10. E
11. E
12. B
13. B
14. D
15. D
16. E
17. C
18. D
19. A
20. C