1. (18 points) Consider the function $F$ whose graph is given below. Evaluate each of the following expressions. Note: Enter ‘DNE’ if the limit does not exist. The tick marks are one unit apart.

\[ F(x) \]

(a) \( \lim_{x \to -1^-} F(x) = \)
(b) \( \lim_{x \to -1^+} F(x) = \)
(c) \( \lim_{x \to -1} F(x) = \)
(d) \( F(-1) = \)
(e) \( \lim_{x \to 1^-} F(x) = \)
(f) \( \lim_{x \to 1^+} F(x) = \)
(g) \( \lim_{x \to 1} F(x) = \)
(h) \( \lim_{x \to 3} F(x) = \)
(i) \( F(3) = \)

2. (6 points) Evaluate the limit

\[ \lim_{x \to -7} \frac{x^2 + 8x + 7}{x + 7} \]
3. (6 points) Evaluate the limit
\[
\lim_{x \to 2} \frac{x - 2}{x^2 + 3x - 10}
\]

4. (6 points) Evaluate the limit
\[
\lim_{x \to 1} \frac{x^4 - 1}{x^2 - 1}
\]

5. (6 points) Evaluate the limit
\[
\lim_{t \to 9} \frac{9 - t}{3 - \sqrt{t}}
\]

6. (6 points) Evaluate the limit
\[
\lim_{x \to 4} \frac{\frac{1}{x} - \frac{1}{4}}{x - 4}
\]
7. (8 points) Find the midpoint of the segment joining (6, 3) and (−2, 7). Then find the distance from that midpoint to the point (1, 0).

8. (8 points) Let a polynomial be defined by \( p(x) = (2x - 3)^4(x - 1)(3x + 5)^3 \). What is the degree of \( p \)? When \( p \) is written in standard form \( a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0 \) where \( a_n \neq 0 \), what is \( a_8 \)? What is \( a_0 \)?

9. (18 points) Let

\[
 f(x) = \begin{cases} 
 9 & \text{if } x < -5 \\
 -2x + 8 & \text{if } -5 \leq x < 2 \\
 0 & \text{if } x = 2 \\
 4 & \text{if } x > 2 
\end{cases}
\]

Sketch the graph of this function and find following limits if they exist (if not, enter DNE).

(a) \( \lim_{x \to -2^-} f(x) \)
(b) \( \lim_{x \to -2^+} f(x) \)
(c) \( \lim_{x \to -2} f(x) \)
(d) \( \lim_{x \to -5^-} f(x) \)
(e) \( \lim_{x \to -5^+} f(x) \)
(f) \( \lim_{x \to -5} f(x) \)
10. (12 points) Consider the function whose properties are displayed.

<table>
<thead>
<tr>
<th></th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f(x)$</td>
<td>DNE</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>$f(x)$</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>DNE</td>
</tr>
<tr>
<td>$g(x)$</td>
<td>DNE</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>$g(x)$</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>DNE</td>
</tr>
</tbody>
</table>

Using the table above calculate the limits below. Enter 'DNE' if the limit doesn’t exist OR if limit can’t be determined from the information given.

(a) $\lim_{x \to -1^-} [f(x) + g(x)]$
(b) $\lim_{x \to 3} [f(x) + g(x)]$
(c) $f(1)g(1)$
(d) $f(2) + g(0)$

11. (6 points) Evaluate the limit

$$\lim_{x \to \infty} \frac{2 + 4x}{9 - 2x}$$

12. (6 points) Evaluate the limit

$$\lim_{x \to \infty} \frac{2x^3 - 10x^2 - 3x}{7 - 6x - 10x^4}$$

13. (8 points) Find the (implied) domain of

$$f(x) = \frac{\sqrt{x - 7}}{(x - 2)(x - 9)},$$

and write your answer in interval notation.
14. (8 points) Find all the $x$-intercepts of the function
\[ g(x) = 3(2x - 7)^3(2x + 1)^2 - 6(2x - 7)^2(2x + 1)^3. \]

15. (8 points) Compute the exact value of $|6\pi - 10\sqrt{2}| + |6\pi - 20| - |5\sqrt{2} - 8|$. No points for a decimal approximation.

16. (8 points) Find an equation for a line perpendicular to the line $2x - 5y = 11$ and which goes through the point $(-2, 6)$.

17. (8 points) Suppose $f(x) = \sqrt{3x - 1}$ and $g(x) = x^2 + 4$. Find the two composite functions

(a) $f \circ g(x)$

(b) $g \circ f(x)$
18. (15 points) Let \( f(x) = \sqrt{2x - 1} \).

(a) Find the slope of the line joining the points \((5, 3)\) and \((x, f(x))\), where \(x \neq 5\).

(b) Then find the limit of the expression in (a) as \(x \to 5\). Call this limit \(f'(5)\).

(c) Use the information found in (b) to write an equation for the line tangent to the graph of \(f\) at the point \((5, 3)\).