1. A builder wishes to construct a ramp that is 32 feet long. One end of the ramp will sit on the level ground and the other end will be 7 feet above the level ground. Approximate the acute angle between the ramp and the level ground to one decimal place.

1) 14.7°
2) 14.4°
3) 14.1°
4) 13.8°
5) 13.5°
6) 13.2°
7) 12.9°
8) 12.6°
9) 12.3°

2. If the angle θ is in standard position, which of the following is a pair of angles that are both coterminal to θ?

$\theta = 580°$

1) $760°, 400°$
2) $40°, 760°$
3) $-140°, 400°$
4) $-140°, 760°$
5) $940°, -320°$
6) $-320°, 400°$
7) $-320°, 760°$
8) $220°, -320°$
9) $220°, 940°$

3. Find the zeros of f.

$$f(x) = x^2e^{-3x} + xe^{-3x} - 30e^{-3x}$$

1) $-30, -6, 5$
2) $-6, 0, 5$
3) $-6, 1, 5$
4) $-30, 0$
5) $-30, 1$
6) -30
7) 0
8) 1
9) None of the above

4. Suppose $\$31,000$ is deposited in a savings account that has an interest rate of 5.7 % per year and the interest is compounded monthly. How much money will be in the account after 17 years? Round your answer to the nearest cent.

1) $\$11,790.35$
2) $\$12,080.56$
3) $\$15,660.34$
4) $\$28,600.62$
5) $\$33,600.67$
6) $\$61,365.21$
7) $\$79,549.32$
8) $\$81,507.34$
9) None of the above

5. Suppose that a certain language originally had N_0 basic words and that at time *t*, measured in millennia (1 millennium = 1000 years), the number $N(t)$ of basic words that are still in common use is given by $N(t) = N_0(0.765)^t$. Approximate the percentage of basic words lost every 200 years.

1) 4.4%
2) 5.2%
3) 23.5%
4) 26.2%
5) 73.8%
6) 76.5%
7) 94.8%
8) 95.6%
9) None of the above

6. Solve the equation.

$$\log_2(x+6) + \log_2(x-1) = 3$$

1) $x = -\frac{5}{2} \pm \frac{1}{2}\sqrt{61}$
2) $x = -\frac{5}{2} + \frac{1}{2}\sqrt{61}$
3) $x = -\frac{5}{2} \pm \frac{1}{2}\sqrt{85}$
4) $x = -\frac{5}{2} + \frac{1}{2}\sqrt{85}$
5) $x = -7, 2$
6) $x = \frac{15}{8}$
7) $x = \frac{9}{2}$
8) $x = \frac{3}{2}$
9) None of the above

7. If the polluting of a lake were suddenly stopped by federal regulations, it has been estimated that the level y of pollutants in the lake would decrease according to the formula $y = y_0 e^{-0.37t}$, where t is the time in years and y_0 is the pollutant level at the time when the polluting was stopped. Approximately how many years would it take to eliminate 80% of the pollution from the lake.

1) 0.1 years
2) 0.2 years
3) 0.6 years
4) 0.8 years
5) 1.3 years
6) 4.3 years
7) 5.0 years
8) 8.1 years
9) 11.8 years

8. Find a polynomial f of degree 3 that has zeros when $x = -1, 2, 4$ and $f(3) = -8$.

1) $f(x) = -\frac{4}{35}x^3 - \frac{4}{7}x^2 - \frac{8}{35}x + \frac{32}{35}$
2) $f(x) = -\frac{4}{35}x^3 + \frac{4}{7}x^2 - \frac{8}{35}x - \frac{32}{35}$
3) $f(x) = -2x^3 + 10x^2 - 4x - 16$
4) $f(x) = 2x^3 - 10x^2 + 4x + 16$
5) $f(x) = 2x^3 + 10x^2 + 4x - 16$
6) $f(x) = x^3 + 5x^2 + 2x - 8$
7) $f(x) = x^3 - 5x^2 + 2x + 8$
8) $f(x) = -x^3 + 5x^2 - 2x - 8$
9) $f(x) = -x^3 - 5x^2 - 2x + 8$

9. Given $f(x) = \sqrt{5 - x}$, find $f^{-1}(x)$.

1) $f^{-1}(x) = -x^2 + 5, \quad x \geq 0$
2) $f^{-1}(x) = -x^2 + 5, \quad x \leq 0$
3) $f^{-1}(x) = x^2 + 5, \quad x \geq 0$
4) $f^{-1}(x) = x^2 + 5, \quad x \leq 0$
5) $f^{-1}(x) = -x^2 - 5, \quad x \geq 0$
6) $f^{-1}(x) = -x^2 - 5, \quad x \leq 0$
7) $f^{-1}(x) = x^2 - 5, \quad x \geq 0$
8) $f^{-1}(x) = x^2 - 5, \quad x \leq 0$
9) None of the above

10. Find the domain of $g \circ f$, where $f(x) = \dfrac{x+2}{x-1}$ and $g(x) = \dfrac{x-5}{x+4}$.

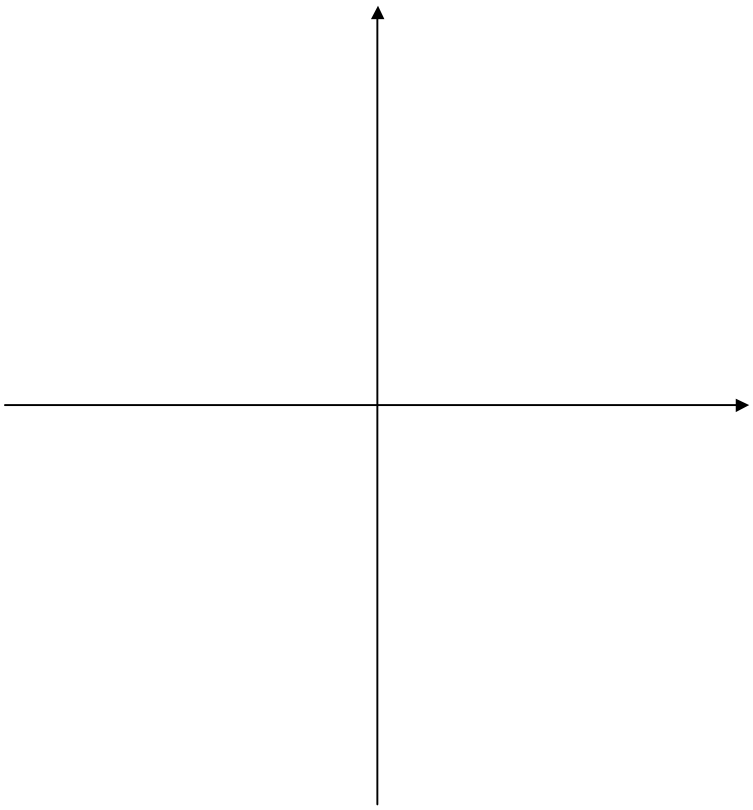
1) $(-\infty, \frac{2}{5}) \cup (\frac{2}{5}, 1) \cup (1, \frac{7}{4}) \cup (\frac{7}{4}, \infty)$
2) $(-\infty, -4) \cup (-4, \frac{2}{5}) \cup (\frac{2}{5}, \frac{7}{4}) \cup (\frac{7}{4}, \infty)$
3) $(-\infty, -4) \cup (-4, \frac{2}{5}) \cup (\frac{2}{5}, 1) \cup (1, \infty)$
4) $(-\infty, \frac{2}{5}) \cup (\frac{2}{5}, 1) \cup (1, \infty)$
5) $(-\infty, -4) \cup (-4, 1) \cup (1, \infty)$
6) $(-\infty, -4) \cup (-4, \frac{2}{5}) \cup (\frac{2}{5}, \infty)$
7) $(-\infty, 1) \cup (1, \infty)$
8) $(-\infty, \frac{2}{5}) \cup (\frac{2}{5}, \infty)$
9) $(-\infty, -4) \cup (-4, \infty)$

11. Which of the following are true of the function $f(x) = \dfrac{2}{x}$?

I. f has a y - intercept at $(0,2)$

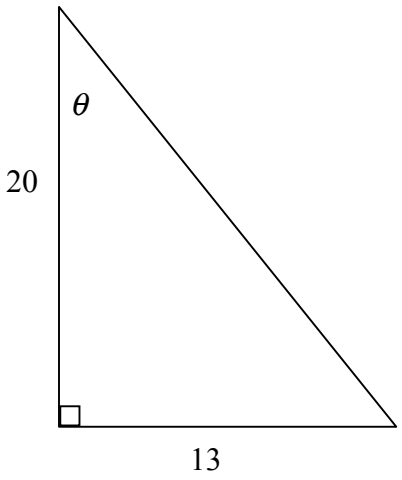
II. The graph of f is increasing on the interval $(-\infty, 0)$

III. The range of the function is $(-\infty, 0) \cup (0, \infty)$



1) I
2) II
3) III
4) I and II
5) I and III
6) II and III
7) I, II, and III
8) Cannot be determined
9) None of the above

12. Determine the exact value of $\sin\theta$.



1) $\sin\theta = \frac{20\sqrt{569}}{569}$

2) $\sin\theta = \frac{13\sqrt{569}}{569}$

3) $\sin\theta = \frac{\sqrt{569}}{20}$

4) $\sin\theta = \frac{\sqrt{569}}{13}$

5) $\sin\theta = \frac{13}{20}$

6) $\sin\theta = \frac{20}{13}$

7) $\sin\theta = \frac{\sqrt{231}}{20}$

8) $\sin\theta = \frac{\sqrt{231}}{13}$

9) None of the above

13. Given $f(x) = x^4 + 5x^2 - 36$. Find all values of x such that $f(x) > 0$.

1) $(-\infty,-3)\cup(-2,2)\cup(3,\infty)$

2) $(-3,2)\cup(2,3)$

3) $(-3,\infty)$

4) $(-\infty,-9)\cup(4,\infty)$

5) $(-9,4)$

6) $(-9,\infty)$

7) $(-\infty,-2)\cup(2,\infty)$

8) $(-2,2)$

9) $(-2,\infty)$

14. The population density D (in people per square mile) in a large city is related to the distance x (in miles from the center of the city by the function, $D(x)=\frac{3400x}{x^2+64}$. **According to this function**, in what areas of the city does the population density exceed 100 people per square mile **and** what value does the population density eventually approach as the distance from the center of the city approaches infinity.

1) $[0,2)\cup(32,\infty)$; density approaches 0
2) $[0,2)$; density approaches 0
3) $(2,32)$; density approaches 0
4) $(32,\infty)$; density approaches 0
5) $[0,2)\cup(32,\infty)$; density approaches 3400
6) $[0,2)$; density approaches 3400
7) $(2,32)$; density approaches 3400
8) $(32,\infty)$; density approaches 3400
9) None of the above

15. Find the exact values of $\cos\theta$ and $\cot\theta$ for the acute angle θ, given that $\csc\theta = 3$.

1) $\cos\theta=\frac{3\sqrt{10}}{10}$, $\cot\theta=2\sqrt{2}$
2) $\cos\theta=\frac{2\sqrt{2}}{3}$, $\cot\theta=2\sqrt{2}$
3) $\cos\theta=\frac{3\sqrt{2}}{4}$, $\cot\theta=2\sqrt{2}$
4) $\cos\theta=\frac{3\sqrt{10}}{10}$, $\cot\theta=\frac{\sqrt{2}}{4}$
5) $\cos\theta=\frac{2\sqrt{2}}{3}$, $\cot\theta=\frac{\sqrt{2}}{4}$
6) $\cos\theta=\frac{3\sqrt{2}}{4}$, $\cot\theta=\frac{\sqrt{2}}{4}$
7) $\cos\theta=\frac{3\sqrt{10}}{10}$, $\cot\theta=\frac{\sqrt{10}}{10}$
8) $\cos\theta=\frac{2\sqrt{2}}{3}$, $\cot\theta=\frac{\sqrt{10}}{10}$
9) $\cos\theta=\frac{3\sqrt{2}}{4}$, $\cot\theta=\frac{\sqrt{10}}{10}$

16. Which of the following are true of the function $f(x)=\left|\log_2(x+4)\right|$?

I. f has a y-intercept at (0,2).

II. The graph of f has an asymptote $y=4$.

III. The range of f is $(-\infty,\infty)$.

1) I
2) II
3) III
4) I and II
5) I and III
6) II and III
7) I, II, and III
8) Cannot be determined
9) None of the above

17. Find the exact values of all angles θ in the interval $[0,2\pi)$ that satisfy the following equation.

$$\tan\theta=-\frac{1}{\sqrt{3}}$$

1) $\frac{5\pi}{6}, \frac{7\pi}{6}$
2) $\frac{\pi}{6}, \frac{7\pi}{6}$
3) $\frac{2\pi}{3}, \frac{5\pi}{3}$
4) $\frac{2\pi}{3}, \frac{4\pi}{3}$
5) $\frac{5\pi}{6}, \frac{11\pi}{6}$
6) $\frac{\pi}{3}, \frac{4\pi}{3}$
7) $\frac{\pi}{3}, \frac{2\pi}{3}$
8) $\frac{7\pi}{6}, \frac{11\pi}{6}$
9) None of the above

18. Which of the following are true of the function $f(x) = -7\sin(\frac{1}{2}x - \frac{\pi}{3})$?

I. The maximum value of the function f is 7 and occurs when $x = \frac{\pi}{2}$.

II. The period of the function is 4π.

III. The phase shift of f is $\frac{2\pi}{3}$.

1) I
2) II
3) III
4) I and II
5) I and III
6) II and III
7) I, II, and III
8) Cannot be determined
9) None of the above

19. The power, *P*, supplied to a resistor is directly proportional to the square of the voltage, *V*, and is inversely proportional to the resistance, *R*. What is the effect on the power if the voltage is tripled and the resistance is reduced to one-fourth of *R*.

1) The power decreases by a factor of $\frac{1}{12}$
2) The power decreases by a factor of $\frac{1}{36}$
3) The power decreases by a factor of $\frac{3}{4}$
4) The power decreases by a factor of $\frac{4}{9}$
5) The power increases by a factor of 12
6) The power increases by a factor of 36
7) The power increases by a factor of $\frac{4}{3}$
8) The power increases by a factor of $\frac{9}{4}$
9) None of the above