

Review - 1

PROBLEMS

1. Solve for x :

(a) $0 \leq \frac{2}{3}x + 5 < 7$

(b) $\left| \frac{2x - 3}{-5} \right| = 4$

(c) $|3x + 5| < 9$

(d) $9 - x^2 \geq 0$

2. For $P(-1, 1)$ and $Q(2, -3)$:

(a) find the distance from P to Q .

(b) find the slope of the line l through P and Q .

(c) write an equation of the line l .

3. Write an equation of the line that passes through the point $P(3, -4)$ and is

(a) horizontal.

(b) vertical.

(c) parallel to the line $2x + 4y = -5$.

(d) perpendicular to the line $3x - y = 1$.

4. (a) Convert from degrees to radians: 150° , -225° .

(b) Convert from radians to degrees: $-\frac{3\pi}{4}$, $\frac{5\pi}{2}$.

(c) Find the exact value of each expression:

$$\sin\left(\frac{\pi}{3}\right)$$

$$\cos\left(\frac{2\pi}{4}\right)$$

$$\tan\left(-\frac{\pi}{4}\right)$$

$$\csc\left(\frac{\pi}{2}\right)$$

$$\sec(5\pi)$$

$$\cot\left(\frac{\pi}{6}\right)$$

$$\arcsin\left(-\frac{1}{2}\right)$$

$$\arccos\left(\frac{1}{2}\right)$$

$$\arctan\left(\frac{1}{\sqrt{3}}\right)$$

$$\cos\left(\arccos\left(\frac{\sqrt{2}}{2}\right)\right)$$

$$\arcsin\left(\sin\left(\frac{\pi}{6}\right)\right)$$

$$\sin^2(5) + \cos^2(5)$$

5. Sketch the graphs of:
- (a) $\sin x$
 - (b) $\sin x + 2$
 - (c) $\sin\left(x - \frac{\pi}{2}\right)$
 - (d) $2 \sin x$
 - (e) $\sin(2x)$
6. Find a formula for the function whose graph is obtained from the graph of $f(x) = e^x - 1$ by
- (a) Reflecting about the y -axis.
 - (b) Vertically compressing by a factor of 5 and then shifting 3 units to the left.
 - (c) Reflecting about the x -axis and then shifting 2 units down.
7. Let $f(x) = 2 - x$, $g(x) = \ln x$, $h(x) = \sqrt{x + 1}$. Find the following functions and state their domains:
- (a) $g \circ f$
 - (b) $h \circ g$
 - (c) $f \circ h$
8. Find the inverse function of:
- (a) $f(x) = \frac{5x + 1}{3x + 2}$
 - (b) $g(x) = e^{3x} + 2$
9. Simplify:
- (a) $\log_2 8$
 - (b) $\log_6 \frac{1}{36}$
 - (c) $2^{\log_4 5}$
 - (d) $\log_5 10 + \log_5 20 - 3 \log_5 2$
 - (e) $e^{3 \ln 2}$
10. Solve for x :
- (a) $2^{3x-4} = 5$
 - (b) $-\ln(x + 5) = 3$
 - (c) $\ln(x^3) + \ln 3 = \ln x$

11. Evaluate the limits:

- (a) $\lim_{x \rightarrow 5} (7x - 25)$
- (b) $\lim_{x \rightarrow -1} \frac{x^3 + x^2}{x^2 + 3x + 2}$
- (c) $\lim_{x \rightarrow 0} \frac{3 - \sqrt{9 + x}}{x}$
- (d) $\lim_{x \rightarrow 2^+} \frac{x^3 - 2}{x^2 - x - 2}$
- (e) $\lim_{x \rightarrow 2^-} \frac{x^3 - 2}{x^2 - x - 2}$
- (f) $\lim_{x \rightarrow 2} \frac{x^3 - 2}{x^2 - x - 2}$
- (g) $\lim_{x \rightarrow 0} x^4 \cos\left(\frac{1}{x}\right)$
- (h) $\lim_{x \rightarrow \infty} \frac{2x^3 + x - 5}{5x^3 - x^2}$
- (i) $\lim_{x \rightarrow -\infty} \frac{x + 1}{x^2 + 1}$
- (j) $\lim_{x \rightarrow \infty} \sqrt{x^2 + 3x - 2} - x$
- (k) $\lim_{x \rightarrow \infty} \sin x$

12. Find c such that the function is continuous on \mathbb{R} .

- (a) $f(x) = \begin{cases} cx & \text{if } x \geq 2 \\ 5 - x & \text{if } x < 2 \end{cases}$
- (b) $g(x) = \begin{cases} 4x - 4 & \text{if } x > c \\ x^2 & \text{if } x \leq c \end{cases}$

13. Show that the equation $x^5 - 4x + 2 = 0$ has at least one solution in the interval $(1, 2)$.

14. Find the horizontal and vertical asymptotes of $f(x) = \frac{(x + 2)(3x - 4)}{(x - 5)(x + 7)}$.