

Calculus
Initial Skills Exam (Sample)

Name: _____
Date: _____

Directions: Answer each question to the best of your ability. Be sure to provide explanations where requested (use the space provided). No calculators please.

For items 1-3, show all work.

1. TRUE or FALSE: For any numbers a and b , $\sqrt{a^2 + b^2} = a + b$. Explain your answer.

2. TRUE or FALSE: If x is any number, then $x^2 \geq x$. Explain your answer.

3. Factor $2x^4 - 6x^3 - 8x^2 + 24x$ completely. Show all work.

Items 4-10 are multiple choice. Circle your answer.

4. Find $\sin\left(\frac{2\pi}{3}\right)$.

(a) $\frac{\sqrt{3}}{2}$

(b) $-\frac{\sqrt{3}}{2}$

(c) $\frac{1}{2}$

(d) $-\frac{1}{2}$

5. Find the solution(s) to $\sin^2 \theta = \frac{1}{2}$ on the interval $[0, 2\pi]$.

(a) $\frac{\pi}{4}$ and $\frac{3\pi}{4}$

(b) $\frac{\pi}{6}$ and $\frac{5\pi}{6}$

(c) $\frac{\pi}{4}$, $\frac{3\pi}{4}$, $\frac{5\pi}{4}$, and $\frac{7\pi}{4}$

(d) $\frac{\pi}{6}$, $\frac{5\pi}{6}$, $\frac{7\pi}{6}$, and $\frac{11\pi}{6}$

6. Evaluate $\arctan \frac{\sqrt{3}}{3}$.

(a) $\frac{\pi}{3}$

(b) $-\frac{\pi}{3}$

(c) $\frac{\pi}{6}$

(d) $-\frac{\pi}{6}$

7. Find the exact solutions to $x^2 + 4x = 7$.

(a) $x = 3$ and $x = 7$

(b) $x = -2 + \sqrt{11}$ and $x = -2 - \sqrt{11}$

(c) $x = 3$ and $x = -\frac{1}{2}$

(d) $x = -2 + i\sqrt{3}$ and $x = -2 - i\sqrt{3}$

8. Given that $f(x) = x^3 + 5$, find $f^{-1}(x)$.

(a) $f^{-1}(x) = \sqrt[3]{x} - \sqrt[3]{5}$

(b) $f^{-1}(x) = \sqrt[3]{x} - 5$

(c) $f^{-1}(x) = \frac{1}{x^3 + 5}$

(d) $f^{-1}(x) = \sqrt[3]{x-5}$

9. Write $\ln(x+1) - 3\ln(x+2)$ as a single logarithm.

(a) $\frac{\ln(x+1)}{\ln(x+2)^3}$

(b) $\frac{x+1}{(x+2)^3}$

(c) $\ln \frac{x+1}{(x+2)^3}$

(d) $\ln \frac{1}{8}$

10. Find the slope of the line passing through the points $(1, -2)$ and $(-3, 4)$.

(a) 1

(b) -1

(c) $\frac{3}{2}$

(d) $-\frac{3}{2}$