MATH 75A

Test 1 - Solutions

Multiple choice questions: circle the correct answer

1. The function $f(x) = 3x^2 + 5x^4$ is

   A. even   **B.** odd   **C.** both even and odd   **D.** neither even nor odd

2. The domain of the function $f(x) = \dfrac{x+6}{x^2 - 2x}$ is

   A. $(0, \infty)$ **B.** $(-\infty, 0) \cup (0, \infty)$ **C.** $(0, 2)$ **D.** $(-\infty, 0) \cup (0, 2) \cup (2, \infty)$

   E. None of the above

3. Let $f(x) = \begin{cases} x^2 + 1 & \text{if } x \geq -2 \\ x - 3 & \text{if } -4 < x < -2 \\ x^2 - 4 & \text{if } x \leq -4 \end{cases}$.   Find $f(-5)$.

   A. -29 **B.** -24 **C.** -8 **D.** 21 **E.** 26

4. If $f(x) = 1 + x$ and $g(x) = x^2 - 6$, find $(fg)(3)$.

   A. 0 **B.** 4 **C.** 7 **D.** 10 **E.** 12

5. Evaluate $\log_4 \left(\dfrac{4}{4^7} \right)$.

   A. -8 **B.** -6 **C.** $\dfrac{1}{7}$ **D.** $\dfrac{1}{6}$ **E.** 8

6. Evaluate $\arccos \left(\dfrac{1}{2} \right)$.

   A. 0 **B.** $\dfrac{\pi}{6}$ **C.** $\dfrac{\pi}{4}$ **D.** $\dfrac{\pi}{3}$ **E.** $\dfrac{\pi}{2}$
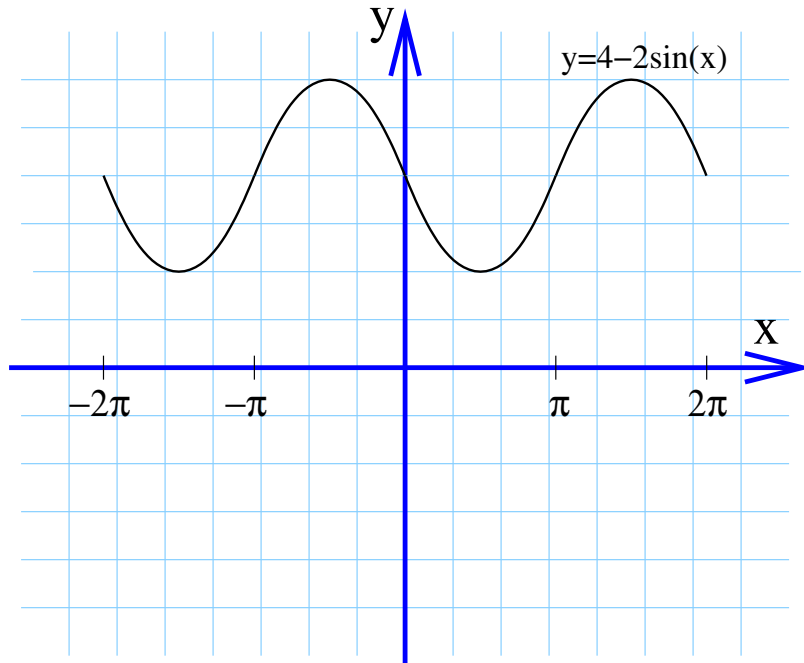
Regular problems: show all your work

7. Use appropriate transformations to sketch the graph of $f(x) = 4 - 2\sin(x)$.

Show your work here:

y

y=−2sin(x)

x

y=sin(x)

y=2sin(x)

Final graph:

y

y=4−2sin(x)

x

-2π $-\pi$ π 2π
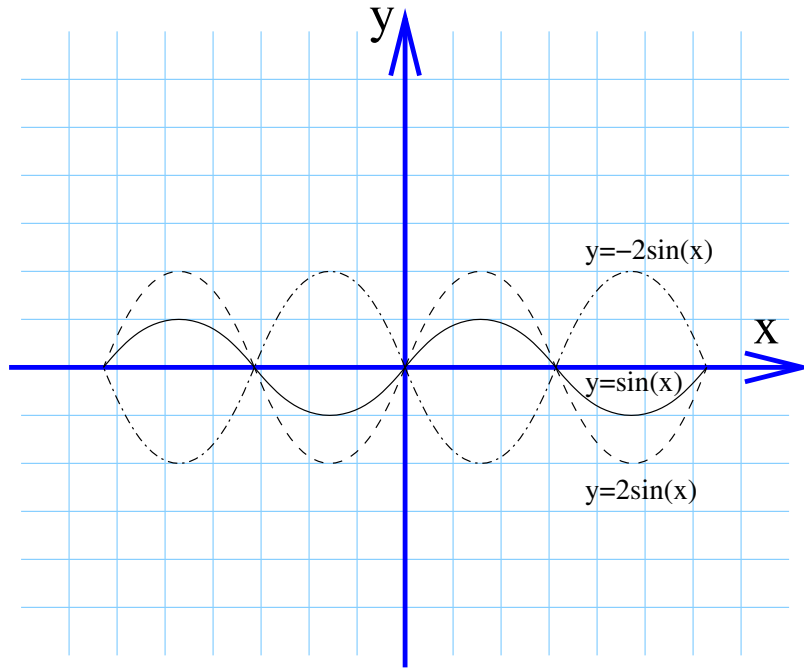
8. Let $f(x) = \dfrac{1}{x-1}$ and $g(x) = \sqrt{x}$. Find the function $f \circ g$.

$$(f \circ g)(x) = f(g(x)) = f(\sqrt{x}) = \dfrac{1}{\sqrt{x}-1}$$

9. Write an equation of the circle whose radius is 4 and center is at $(-2, 1)$.

$$(x - (-2))^2 + (y - 1)^2 = 4^2$$
$$(x + 2)^2 + (y - 1)^2 = 16$$

10. Write an equation of the line that passes through the points $(2, 4)$ and $(-1, 7)$.

First find the slope of the line: $m = \dfrac{7-4}{-1-2} = \dfrac{3}{-3} = -1.$

Then using the first point and the slope, an equation is $y - 4 = -1(x - 2)$

$y - 4 = -x + 2$

$y = -x + 6$

11. Let $f(x) = x^3 - 4$. Find $f^{-1}(x)$.

Solve $y = x^3 - 4$ *for* x:

$y + 4 = x^3$

$x = \sqrt[3]{y + 4}$

So $f^{-1}(y) = \sqrt[3]{y + 4}$, *and*

$f^{-1}(x) = \sqrt[3]{x + 4}.$

12. Simplify:

(a) $\dfrac{x^4 \cdot \sqrt[3]{x^6}}{x^{10}} = \dfrac{x^4 \cdot (x^6)^{\frac{1}{3}}}{x^{10}} = \dfrac{x^4 \cdot x^{6 \cdot \frac{1}{3}}}{x^{10}} = \dfrac{x^4 \cdot x^2}{x^{10}} = \dfrac{x^{4+2}}{x^{10}} = \dfrac{x^6}{x^{10}} = x^{6-10} = x^{-4}$

(b) $\dfrac{x + \frac{2}{x}}{\frac{1}{x} + 1} - \dfrac{x^2}{x+1} = \dfrac{\frac{x^2+2}{x}}{\frac{1+x}{x}} - \dfrac{x^2}{x+1} = \dfrac{x^2 + 2}{x} \cdot \dfrac{x}{1+x} - \dfrac{x^2}{x+1} = \dfrac{(x^2+2)x}{x(1+x)} - \dfrac{x^2}{x+1} =$

$\dfrac{x^2 + 2}{1+x} - \dfrac{x^2}{x+1} = \dfrac{x^2 + 2 - x^2}{1+x} = \dfrac{2}{1+x}$