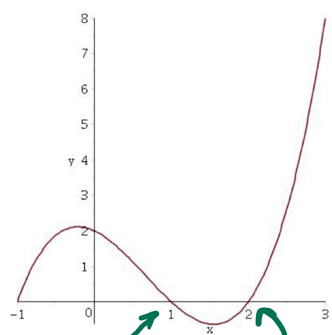
Solutions

Review Problems for Math 131

1. Let $f(x) = \frac{4}{x+1}$. Evaluate $f(2)$ and $f(a^2+3)$.

$f(2) = \frac{4}{2+1} = \frac{4}{3}$ $\quad f(a^3+3) = \frac{4}{(a^2+3)+1} = \boxed{\frac{4}{a^2+4}}$

2. Below is the graph of the function $f(x) = x^3 - 2x^2 - x + 2$.



$x = -1, 1, 2$

(a) Use the graph of $f(x)$ to find the x value(s) where $f(x) = 0$.

(b) When $1 < x < 2$, is $f(x) > 0$ or $f(x) < 0$?

The graph is below the x-axis so $\boxed{f(x) < 0}$.

3. Is the point $(0, 1)$ on the graph of the function $h(x) = \frac{x^2-1}{x^2+1}$?

$\boxed{\text{No}}$ $h(0) = \frac{0-1}{0+1} = -1 \neq 1$.

4. Find the points of intersection of the curves $y = x^2 - 4x + 2$ and $y = x - 4$.

$x^2 - 4x + 2 = y = x - 4$

$-x+4 \quad x^2 - 4x + 2 = x - 4 \quad -x+4$

$x^2 - 5x + 6 = 0$

$(x-3)(x-2) = 0$

$x = 2, 3$

Plug in these x values to get

$y = 2 - 4 \qquad y = 3 - 4$

$y = -2 \qquad y = -1$

$\boxed{(2, -2) \text{ and } (3, -1)}$

5. Simplify the following

(a) $81^{\frac{3}{4}}$ $= \sqrt[4]{81^3} = (\sqrt[4]{81})^3 = (3)^3 = \boxed{27}$

(b) 3^{-2} $= \frac{1}{3^2} = \boxed{\frac{1}{9}}$

(c) $\frac{f(x+h)-f(x)}{h}$ where $f(x) = x^2 + 2x$.

$$= \frac{(x+h)^2 + 2(x+h) - (x^2+2x)}{h} = \frac{\cancel{x^2} + 2xh + h^2 + \cancel{2x} + 2h - \cancel{x^2} - \cancel{2x}}{h}$$

$$= \frac{2xh + h^2 + 2h}{h} = \frac{\cancel{h}(2x+h+2)}{\cancel{h}} = \boxed{2x+h+2}$$

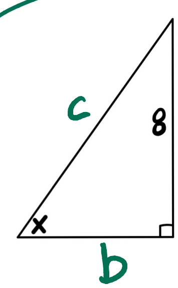
6. Find the equation of the line that passes through the point (3, 2) and has a slope of 3.

$y - y_0 = m(x - x_0)$

$\boxed{y - 2 = 3(x-3) \quad \text{or} \quad y = 3x - 7}$

7. If $\tan(x) = \frac{4}{3}$, find the lengths of the other two sides of the given triangle.

$\frac{4}{3} = \frac{8}{b}$ so $\boxed{b=6}$



Then

$8^2 + 6^2 = c^2$

$64 + 36 = c^2$

$c^2 = 100$ or $\boxed{c = 10}$

8. Find solution(s) to the equation $3x^2 - 2x - 5 = 0$.

$$\frac{2 \pm \sqrt{(-2)^2 - 4(3)(-5)}}{2 \cdot 3} = \frac{2 \pm \sqrt{64}}{6} = \frac{2 \pm 8}{6}$$

$10/6$ and $\frac{-6}{6}$

$\boxed{5/3 \text{ and } -1}$

9. Simplify the following expression by writing it as one fraction:

$$\frac{1}{x} - \frac{x+2}{x-1}.$$

$$\frac{(x-1)}{x(x-1)} - \frac{(x+2)x}{x(x-1)}$$

$$= \frac{(x-1) - x(x+2)}{x(x-1)} = \frac{x - 1 - x^2 - 2x}{x(x-1)} = \boxed{\frac{-x^2 - x - 1}{x(x-1)}}$$