

$$\begin{aligned} \text{high} &= 100\% \\ \bar{x} &= 72.9\% \\ \text{mad} &\approx 72.5\% \end{aligned}$$

Test 1
Dusty Wilson
Math 111

Name: KEY

Why are numbers beautiful? It's like asking why is Beethoven's Ninth Symphony beautiful. If you don't see why, someone can't tell you. I know numbers are beautiful. If they aren't beautiful, nothing is.

Paul Erdos (1913 - 1996)
Hungarian mathematician

No work = no credit

No Symbolic Calculators

Warm-ups (1 pt each):

$$1+1 = \underline{2}$$

$$-1^2 = \underline{-1}$$

$$\frac{1}{0} = \underline{\text{undefined}}$$

1.) (1 pt) Based upon the quote above, how did Erdos explain the beauty of numbers? Answer using complete English sentences.

Beauty is in the eye of the beholder

2.) (4 pts) Find the exact solution to: $3x + 22 = 7x + 2$

$$\Rightarrow 20 = 4x$$

$$\Rightarrow x = 5$$

3.) (4 pts) Find the exact solution to: $\frac{3x}{4} - \frac{1}{3} = 1 - \frac{2}{3}\left(x - \frac{1}{6}\right)$

$$\Rightarrow \frac{3x}{4} - \frac{1}{3} = 1 - \frac{2}{3}x + \frac{2}{18}$$

$$\Rightarrow 27x - 12 = 36 - 24x + 4$$

$$\Rightarrow 51x = 52$$

$$\Rightarrow x = \frac{52}{51}$$

7.) (4 pts) Find and interpret market equilibrium for the following supply and demand functions:
 $D: p = 220 - 4q$ and $S: p = 15q + 30$. Use algebraic methods.

Solve $D = S$
 $\Rightarrow 220 - 4q = 15q + 30$
 $\Rightarrow 190 = 19q$
 $\Rightarrow q = 10$
 and $p = 220 - 4(10)$
 $= 180$

Market equilibrium is reached when 10 units are sold for \$180 ea.

8.) (4 pts) Suppose a manufacturer models its monthly costs with $C(x) = 25x + 3600$ where x is in units produced in a month and C is in dollars.

a.) Find and interpret the C -intercept.

The fixed costs are \$3600.

b.) Find and interpret the slope.

It costs \$25 to produce each item.

9.) (4 pts) Find a good viewing window for $h(x) = 0.02x + 15000$

pts $(0, 15000)$ y-int.
 $(-50000, 0)$ x-int

$[-550,000, 50,000] \times [-1,500, 16,500]$

$h(x) = 0.02x - 5000$
 y-int = -5000
 x-int = 250000
 $[-25000, 275000]$
 $\times [-5500, 500]$

4.) (4 pts) Find the exact solution to: $\frac{2x}{x-3} = 4 + \frac{6}{x-3}$

$$\Rightarrow 2x = 4(x-3) + 6$$

$$\Rightarrow 2x = 4x - 12 + 6$$

$$\Rightarrow 6 = 2x$$

$$\Rightarrow x = 3 \leftarrow \text{extraneous soln.}$$

NO solution,

5.) (4 pts) If $f(x) = 3x + 7$, find $\frac{f(x+h) - f(x)}{h}$

$$\frac{f(x+h) - f(x)}{h} = \frac{3(x+h) + 7 - (3x + 7)}{h}$$

$$= \frac{3h}{h}$$

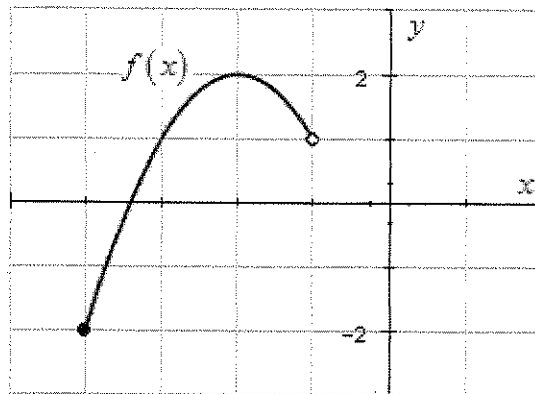
$$= 3$$

6.) (4 pts) Use the graph to answer the following:

a.) Find $f(3)$: 1

b.) Find $f(1)$: undefined

c.) What is the maximum of f : (2, 2)



d.) Give the domain of f in interval or inequality notation: $(-1, 4]$ OR $-1 < x \leq 4$

e.) Give the range of f in interval or inequality notation: $[-2, 2]$ OR $-2 \leq y \leq 2$

10.) (4 pts) If $f(x) = \frac{1}{x^2}$ and $g(x) = 3x - 7$, find $(f \circ g)(x) = f(g(x))$

$$\begin{aligned} f(g(x)) &= f(3x-7) \\ &= \frac{1}{(3x-7)^2} \end{aligned}$$

11.) (8 pts) A street vendor sells Seahawk Super Bowl XLIX champion t-shirts for \$25 per shirt. The fixed costs are \$1500 and the variable costs of are \$5 per shirt.

a.) Write the equation of the revenue function

Let $x = \#$ of shirts sold.

$$R(x) = 25x$$

b.) Write the equation of the cost function

$$C(x) = 5x + 1500$$

c.) Find and interpret the break-even point

$$\text{solve } 25x = 5x + 1500$$

$$\Rightarrow 20x = 1500$$

$$\Rightarrow x = \frac{1500}{20} = 75$$

The vendor breaks even after the sale of 75 shirts.