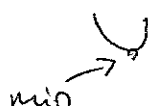


Quiz 3E

1) Consider $f(x) = 2(x-1)^2 + 1$

a) [1] Find the coordinates of the vertex and determine if it's a minimum or maximum.

(1,1) min b/c parabola opens up 

b) [2] Find the roots of f .

ie x-intercepts

$$0 = 2(x-1)^2 + 1 \quad \rightarrow \quad -\frac{1}{2} = (x-1)^2$$

$$\pm \sqrt{-\frac{1}{2}} = x-1 \quad \rightarrow \quad x = 1 \pm i\sqrt{\frac{1}{2}}$$

alg (1.5)

$$-\frac{1}{2} = \frac{2(x-1)^2}{2} \quad \rightarrow \quad 1 \pm \sqrt{-\frac{1}{2}} = x$$

2) Evaluate the expressions

a) [1] $\left(\frac{2}{3} + 6i\right)\left(\frac{1}{6} + 18i\right) = \frac{2}{3} \cdot \frac{1}{6} + \frac{2}{3} \cdot 18i + \frac{1}{6} \cdot 6i + 6i \cdot 18i$

$$= \frac{1}{9} + 12i + i + 108i^2$$

$$= \frac{1}{9} - 108 + 13i = \frac{-971}{9} + 13i$$

FOIL (1.5)

alg (1.5)

$$\begin{array}{r} 108 \\ \times 9 \\ \hline 972 \end{array}$$

b) [2] $\frac{10i}{1-2i} \cdot \frac{(1+2i)}{(1+2i)} = \frac{10i + 20i^2}{1 + 2i - 2i - 4i^2} = \frac{-20 + 10i}{1 + 4}$

$$= \frac{-20 + 10i}{5} = \frac{-20}{5} + \frac{10i}{5} \quad (i^2 = -1)$$

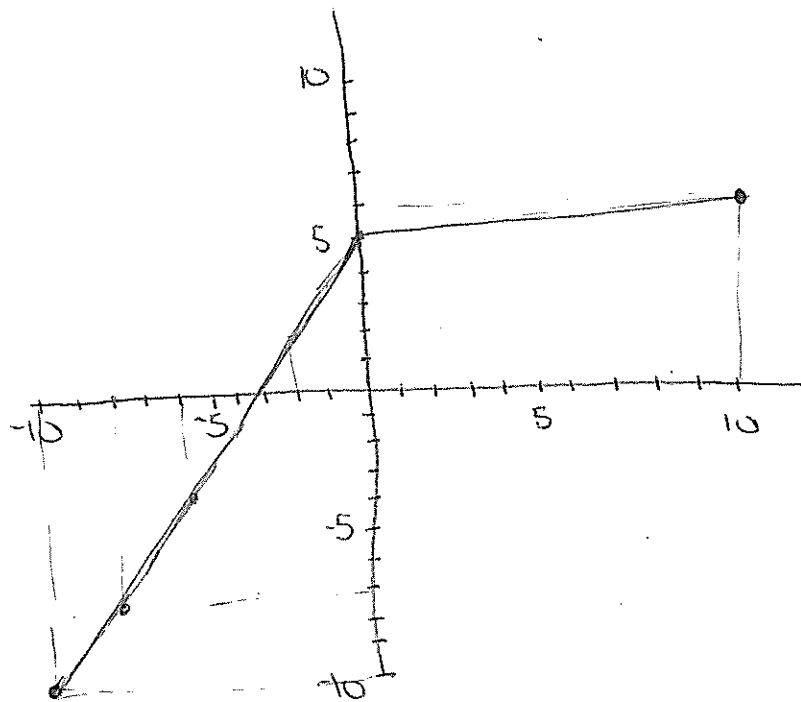
$$= -4 + 2i \quad (+5)$$

simplify/alg (1.5)

3)

a) Does n have an inverse function? why or why not?

yes bc it passes the
 horiz. line test.
 (+.5)
 (actually doesn't pass)
 (+.5)



b) [1] Find $n^{-1}(6)$, if possible.

$n^{-1}(6) = ?$ when $n(?) = 6$ note
 so $n^{-1}(6) = 10$

x	n(x)
10	6

4) [2] The effectiveness of a television commercial depends on how many times a viewer watches it. After some experiments an advertising agency found that if the effectiveness E is measured on a scale of 0 to 10, then $E(n) = \frac{2}{3}n - \frac{1}{25}n^2$ where n is the number of times a viewer watches a given commercial. For a commercial to have maximum effectiveness, how many times should a viewer watch it? (stet) (+.5)

Note $E(n)$'s graph is a parabola opening down, so to maximize effectiveness we want to find the vertex (+.5)

suggest scale

$$E(n) = -\frac{1}{25}n^2 + \frac{2}{3}n$$

$$-25E(n) = n^2 - \frac{50}{3}n$$

$$\left(\frac{-50}{2}\right)^2 + \left(\frac{-50}{6}\right)^2$$

$$-25E(n) + \frac{2500}{36} = \left(n - \frac{25}{3}\right)^2$$

$$-25E(n) = \left(n - \frac{50}{6}\right)^2 - \frac{2500}{36}$$

$$E(n) = \frac{1}{25} \left(n - \frac{25}{3}\right)^2 + \frac{25 \cdot 2500}{36}$$

So viewing a commercial between
 15 and 25 times will maximize
 effectiveness (stet) (+.5)