

Name: Key

Math 150

Quiz 1

Fall 2010

NO CALCULATORS

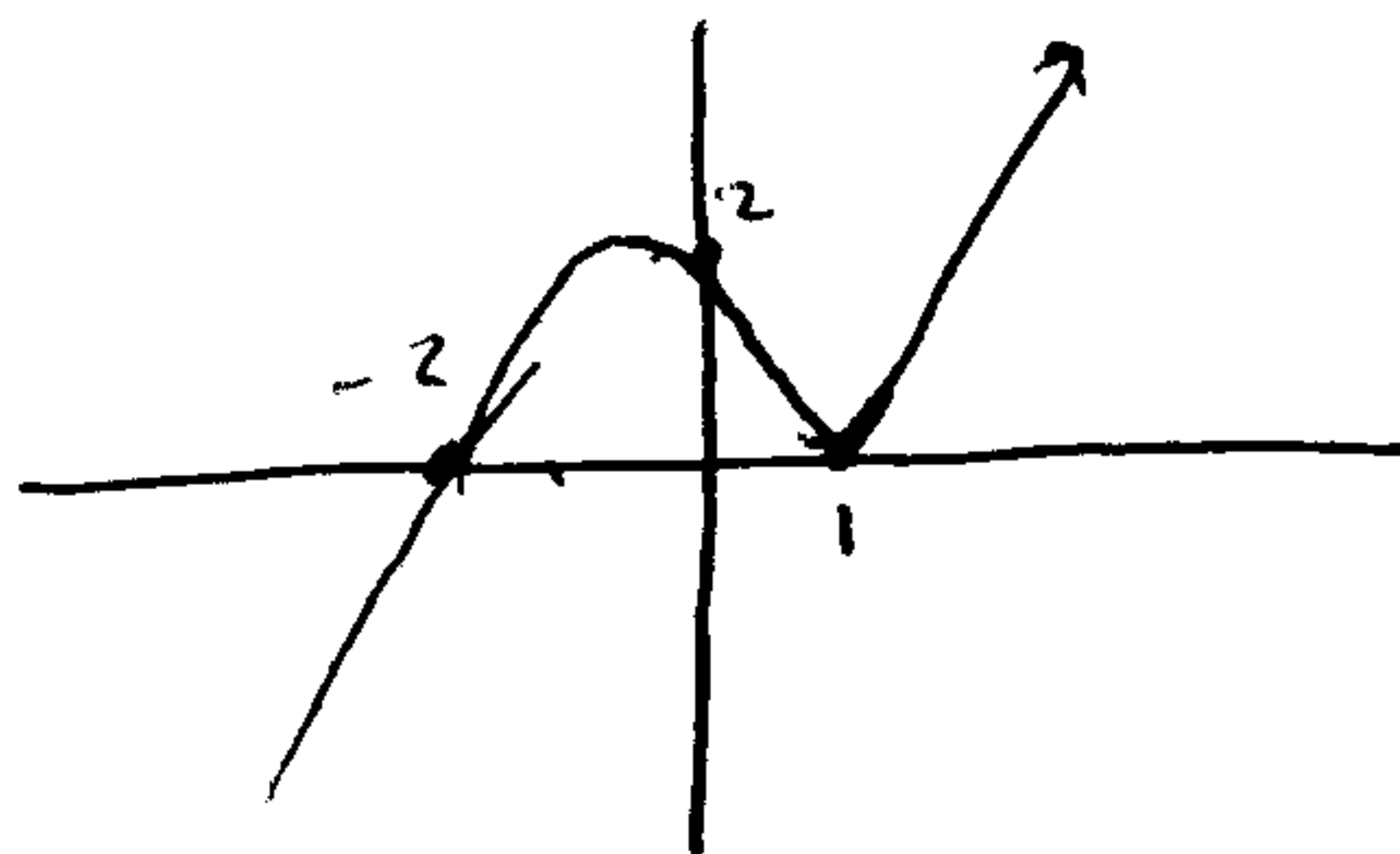
1. [5 points] Factor  $x^3 - 4x^2 + 5x - 2$ .

Try  $x=1$ .  $1 - 4 + 5 - 2 = -3 + 3 = 0$ . Thus  $x-1$  is a factor.

$$\begin{array}{r} x^2 - 3x + 2 \longrightarrow = (x-1)(x-2) \\ x-1 \overline{) x^3 - 4x^2 + 5x - 2} \\ \underline{- x^3 + x^2} \phantom{- 2} \\ -3x^2 + 5x - 2 \\ \underline{-3x^2 + 3x} \phantom{- 2} \\ 2x - 2 \\ \underline{2x - 2} \\ 0 \end{array}$$

$x^3 - 4x^2 + 5x - 2 = (x-1)^2(x-2)$

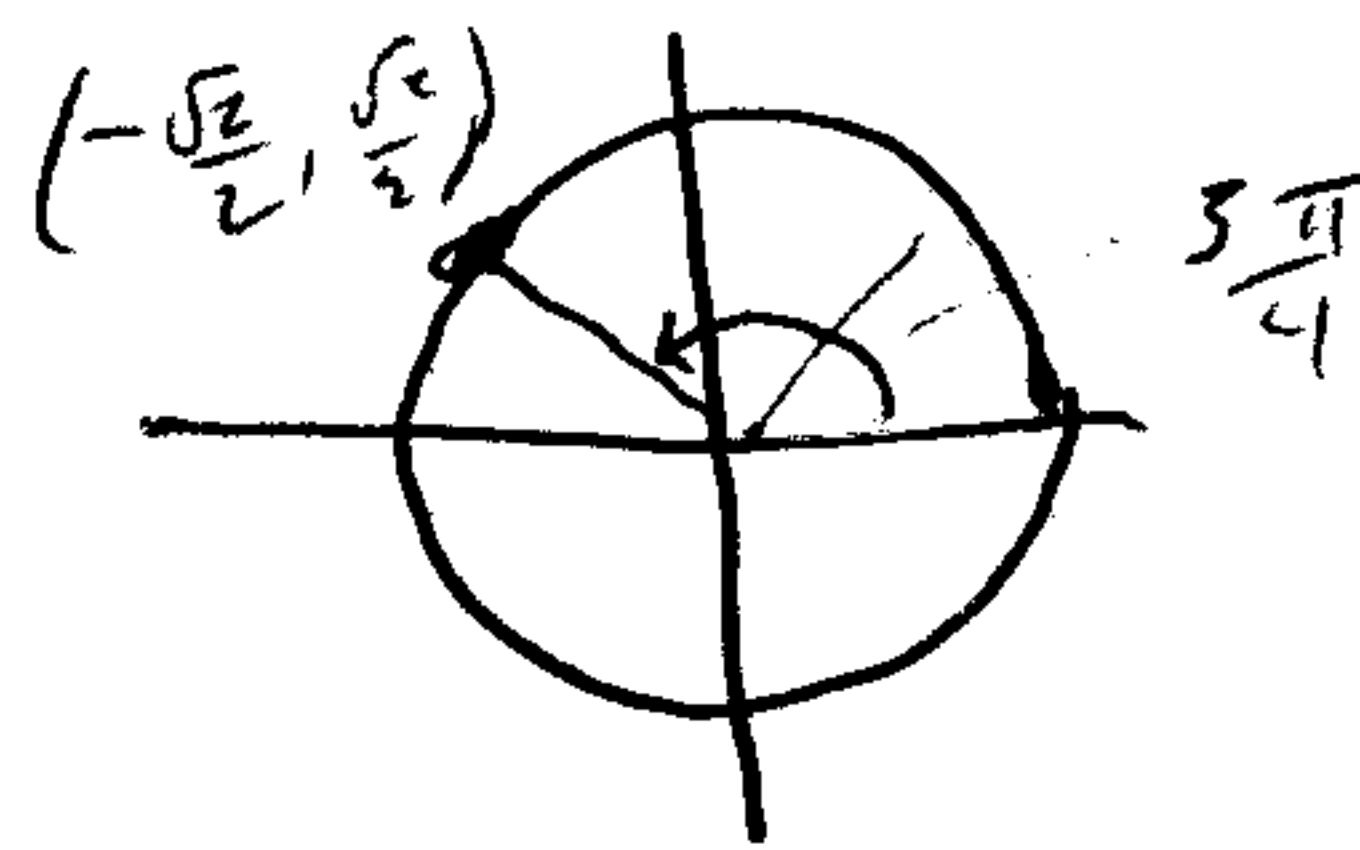
2. [5 points] Graph  $y = (x+2)(x-1)^2$ . Label the intercepts.



3. [5 points] Express  $y = x^2 - 4x + 1$  in the form  $y = a(x-h)^2 + k$ .

$$\begin{aligned} a=1 \quad & x^2 - 4x + \underbrace{+4 - 4} + 1 \\ & (-2)^2 = 4 \\ & x^2 - 4x + 4 - 3 \\ & (x-2)^2 - 3 \\ & h=2, k=-3 \end{aligned}$$

4. [5 points] Find the exact value of  $\sin \frac{3\pi}{4}$ .



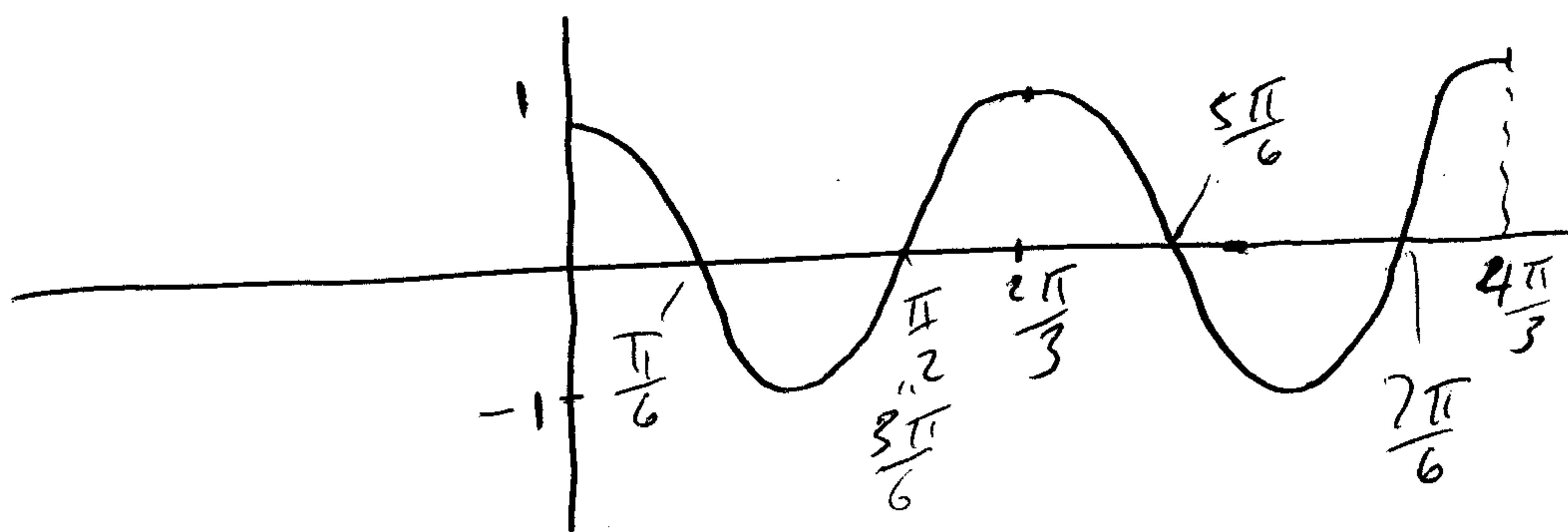
$$\sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

5. [5 points] Prove the identity  $(\sin x + \cos x)^2 = 1 + 2\sin x \cos x$

$$\begin{aligned}(\sin x + \cos x)^2 &= \sin^2 x + 2\sin x \cos x + \cos^2 x \\ &= \sin^2 x + \cos^2 x + 2\sin x \cos x \\ &= 1 + 2\sin x \cos x\end{aligned}$$

Note: One can simplify further using the identity  $\sin 2\theta = 2\sin\theta \cos\theta$

6. [5 points] Graph two full cycles of  $y = \cos 3x$ . Label the zeros.



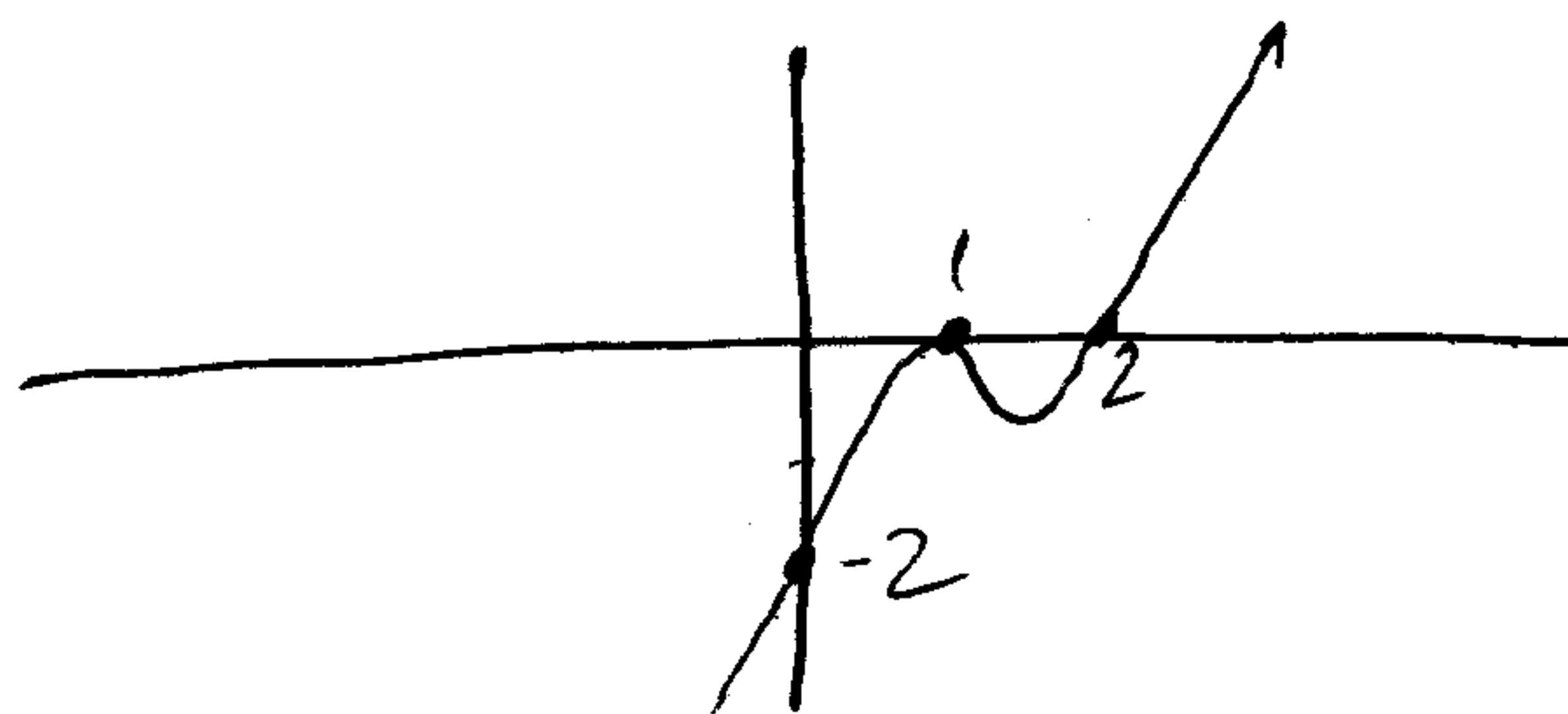
1. [5 points] Factor  $x^3 - 4x^2 + 5x - 2$ .

Try  $x=1$ .  $1 - 4 + 5 - 2 = -3 + 3 = 0$ . Thus  $x-1$  is a factor.

$$x^2 - 3x + 2 = (x-1)(x-2)$$
$$x-1 \overline{) x^3 - 4x^2 + 5x - 2}$$
$$\underline{x^3 - x^2}$$
$$-3x^2 + 5x - 2$$
$$\underline{-3x^2 + 3x}$$
$$2x - 2$$
$$\underline{2x - 2}$$
$$0$$

$x^3 - 4x^2 + 5x - 2 = (x-1)^2(x-2)$

2. [5 points] Graph  $y = (x-2)(x-1)^2$ . Label the intercepts.



$$\text{At } x=0 \quad y = -2(-1)^2 = -2$$

3. [5 points] Express  $y = x^2 + 4x - 1$  in the form  $y = a(x-h)^2 + k$ .

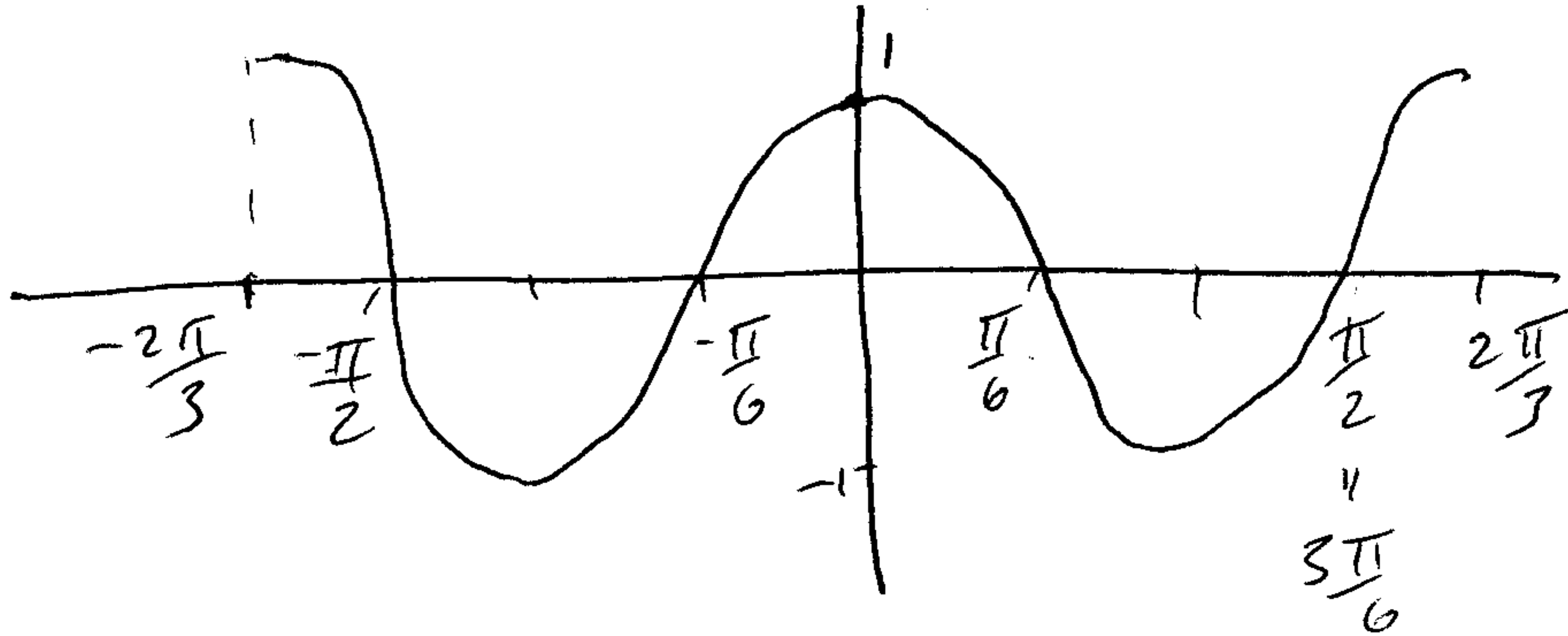
$$x^2 + 4x + 4 - 4 - 1$$
$$(2)^2 = 4$$

$$x^2 + 4x + 4 - 5$$

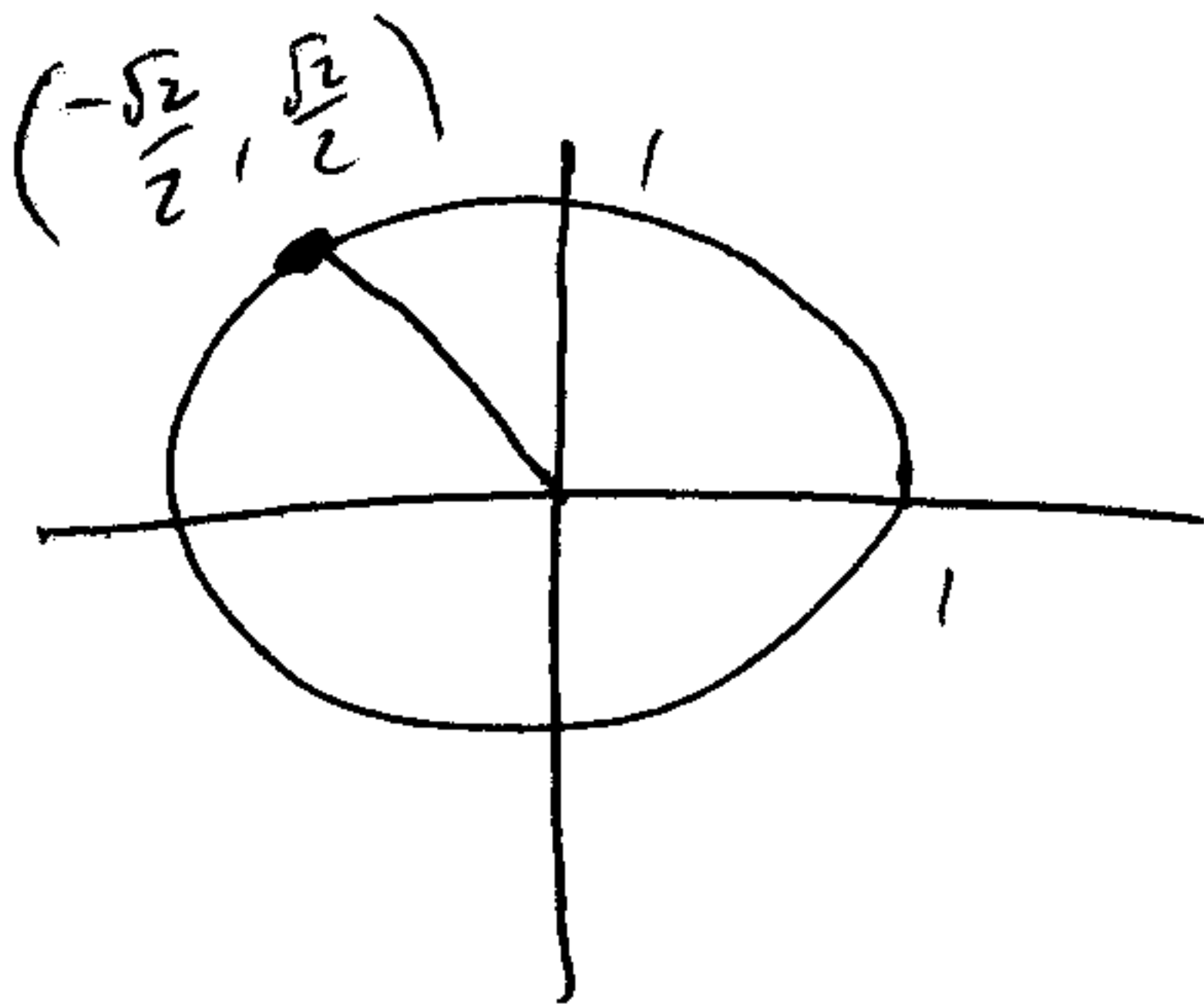
$$(x+2)^2 - 5$$

$$h = -2 \quad k = -5$$

4. [5 points] Graph two full cycles of  $y = \cos 3x$ . Label the zeros.



5. [5 points] Find the exact value of  $\sin \frac{3\pi}{4}$ .



$$\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$$

6. [5 points] Prove the identity  $(\sin x + \cos x)^2 = 1 + 2 \sin x \cos x$

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Note: Can be simplified more using  $\sin 2\theta = 2 \sin \theta \cos \theta$