MATH 1111 PRACTICE TEST 3 FALL 09

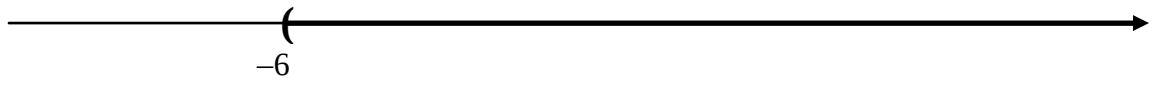
0. (2 points if it is printed neatly)_____

1. Solve the inequality and sketch the solution on the real number line:
$5x-8(x+3)<2x+6$

$$5x-8x-24<2x+6$$
$$-3x-24<2x+6$$
$$-3x-2x<6+24$$
$$-5x<30$$

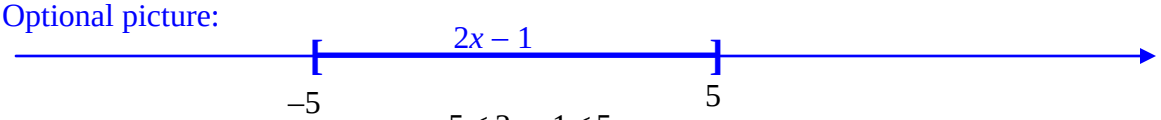
You now divide each side by −6. You reverse the inequality when you divide by a negative.

$$x>-6$$

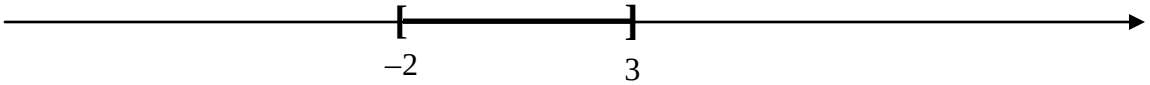


2. Solve $|2x-1|\le 5$

Optional picture:



$$-5\le 2x-1\le 5$$
$$-4\le 2x\le 6$$
$$-2\le x\le 3$$



4. Write $f(x)=2x^2+8x-3$ in the form $f(x)=a(x-h)^2+k$

The problem is to write $f(x)=ax^2+bx+c$ in the form $f(x)=a(x-h)^2+k$, where a is the same in each form and (h, k) is the vertex.

Vertex: $x=\dfrac{-b}{2a}=\dfrac{-8}{2(2)}=-2$

Then

$$y=2(-2)^2+8(-2)-3$$
$$=8-16-3$$
$$=-11$$

Vertex = $(-2, -11)$

$$f(x)=2(x+2)^2-11$$

5. Find the vertex, all intercepts and then graph: $y = x^2 - 4x - 5$

Note that the parabola opens up because $a > 0$

Vertex: $x = \dfrac{-b}{2a} = \dfrac{4}{2(1)} = 2$

Then

$y = 2^2 - 4(2) - 5$

$= 4 - 8 - 5$

$= -9$

Vertex = (2, –9)

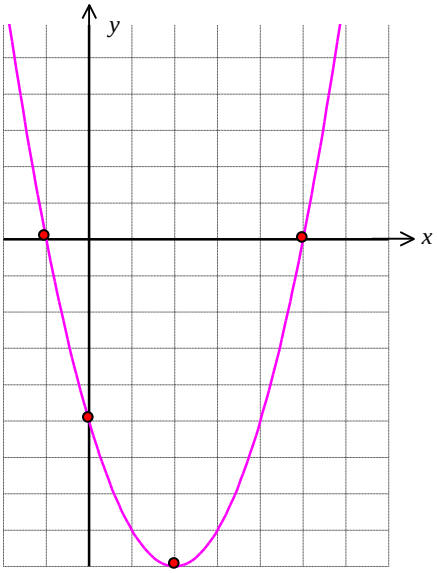
y-intercept: Let $x = 0$. $y = -5$

Since the parabola opens up and the vertex is below the *x*-axis, the graph crosses the *x*-axis and so there will be *x*-intercepts. To find them let *y* = 0.

$0 = x^2 - 4x - 5$

$0 = (x - 5)(x + 1)$

$x = 5, -1$



6. Find the zeros of $f(x) = x^3 - 5x^2 - 24x$

You solve the equation $f(x) = 0$. This one you can solve by factoring

$x^3 - 5x^2 - 24x = 0$

$x(x^2 - 5x - 24) = 0$

$x(x + 3)(x - 8) = 0$

$x=0,\ x+3=0,\ x-8=0$

The zeros are 0, –3, 8

7. Divide: $\dfrac{4x^4-2x^2+x-7}{x+2}$

Make sure you put zero in the x^3 place when you do the synthetic division.

	4	0	–2	1	–7
–2		–8	16	–28	54
	4	–8	14	–27	47

Answer: $\dfrac{4x^4-2x^2+x-7}{x+2}=4x^3-8x^2+14x-27+\dfrac{47}{x+2}$

8. List the potential rational zeros of $f(x)=5x^4-3x^3+5x-7$. Do not attempt to find the zeros.

Potential zeros in this case are of the form $\pm\dfrac{\text{a factor of 7}}{\text{a factor of 5}}$

$$\pm\frac{1}{1},\ \pm\frac{1}{5},\ \pm\frac{7}{1},\ \pm\frac{7}{5}$$

$$=\pm1,\ \pm\frac{1}{5},\ \pm7,\ \pm\frac{7}{5}$$

9. Find the zeros of $f(x)=x^3-2x^2-5x+6$

The potential rational zeros are $\pm1,\ \pm2,\ \pm3,\ \pm6$. If you graph $f(x)$ you will see that the graph appears to cross the x-axis at $x=1$. Check using synthetic division.

	1	–2	–5	6
1		1	–1	–6
	1	–1	–6	0

The fact that the remainder is zero confirms that 1 is a zero. It follows that $x-1$ is a factor of $f(x)$. The other factor is the quotient, shown in red.

$$f(x)=(x-1)(x^2-x-6)$$

In this case you can factor the second factor.

$$f(x)=(x-1)(x-3)(x+2)$$

Answer: The zeros are 1, 3 and –2

10. Solve $x^3-5x^2+11x-15=0$

If you graph the function $f(x)=x^3-5x^2+11x-15$ you will see that 3 appears to be a zero. Confirm that it is using synthetic division.

$$\begin{array}{r|cccc} & 1 & -5 & 11 & -15 \\ 3 & & 3 & -6 & 15 \\ \hline & 1 & -2 & 5 & 0 \end{array}$$

The fact that the remainder is zero confirms that 3 is a zero. It follows that $x-3$ is a factor of $f(x)$. The other factor is the quotient, shown in red.

$$f(x)=(x-3)(x^2-2x+5)$$

In this case you cannot factor further (using the usual techniques). So set each factor equal to zero.

$$x-3=0 \quad \text{or} \quad x^2-2x+5=0$$

The first equation gives the zero we have already found. Use the quadratic formula on the other.

$$\begin{aligned} x &= \frac{-b\pm\sqrt{b^2-4ac}}{2a} \\ &= \frac{2\pm\sqrt{(-2)^2-4(1)(5)}}{2(1)} \\ &= \frac{2\pm\sqrt{4-20}}{2} \\ &= \frac{2\pm\sqrt{-16}}{2} \\ &= \frac{2\pm 4i}{2} \\ &= 1\pm 2i \end{aligned}$$

Answer: The solution is, $x=3, 1\pm 2i$

11. Evaluate each of the following on a calculator: Round answers correct to four decimal places

(a) $3.4^{1.9}$ 10.2285 (b) $0.3^{-2.9}$ 32.8359 (c) e^3 20.0855 (d) $\ln 34$ 3.5264 (e) $\log 13$ 1.1139

12. Find how much money you have if you invest $5,000 for 5 years at 4% compounded quarterly. Round your answer to the nearest cent.

$$A = P(1+\frac{r}{n})^{nt}$$

$$A = 5000(1+\frac{.04}{4})^{4(5)}$$

$$= 6100.95$$

Answer:$6,100.95

13. Find how much you have after 6.3 years if you invest $2,000 at 6% compounded continuously. Round your answer down to the nearest cent.

$$A = Pe^{rt}$$

$$= 2000e^{(.06)(6.3)}$$

$$= 2918.725$$

Make sure you round down!

$2,918.72

14. Without using a calculator find $y = \log_2 8$

Option 1. Use the property $\log_a a^x = x$

$$y = \log_2 2^3 = 3$$

Option 2. Use the inverse property: If $y = \log_a x$ then $a^y = x$.

$$2^y = 8$$

$$2^y = 2^3$$

$$y = 3$$

15. Without using a calculator find $y = \log_{15} 1$

Use the property $\log_a 1 = 0$

0